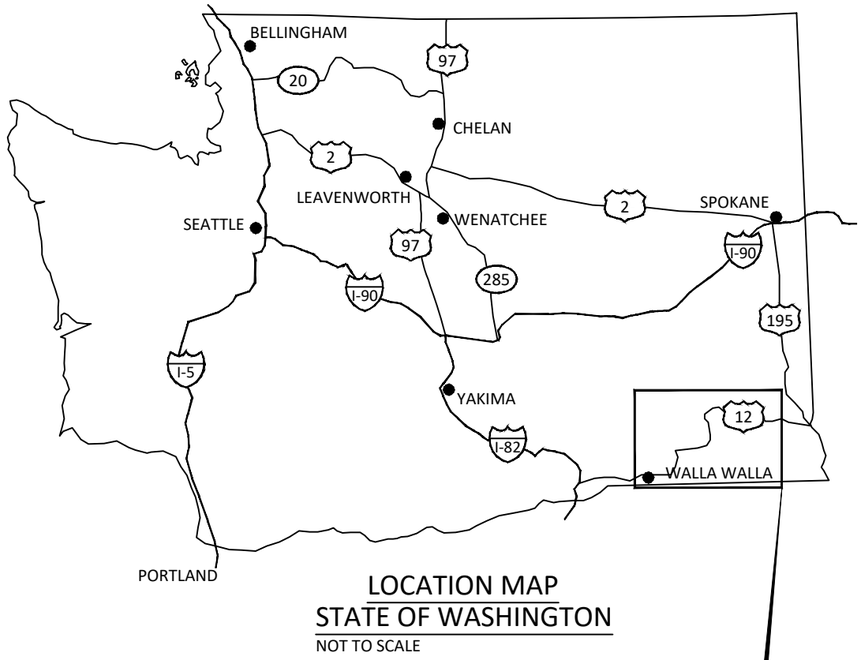
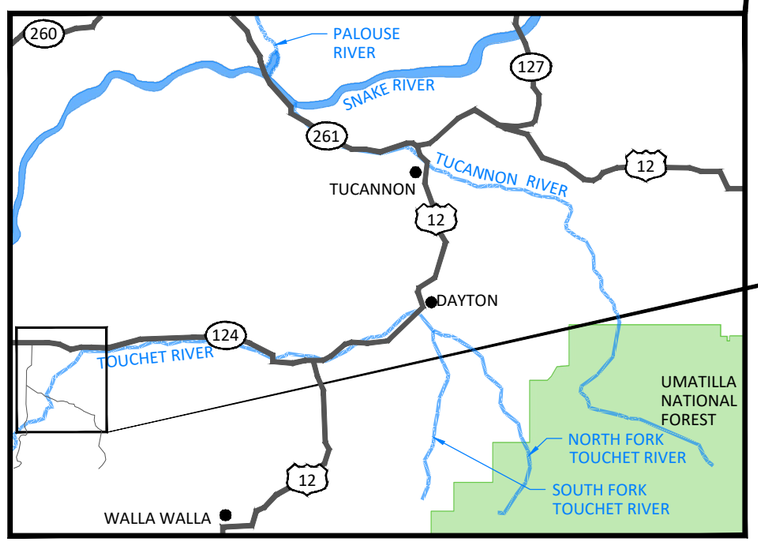
TÚUŠI WÁNA FLOODPLAIN ENHANCEMENT

TOUCHET RIVER RM 14 TO RM 17
PRELIMINARY DESIGN

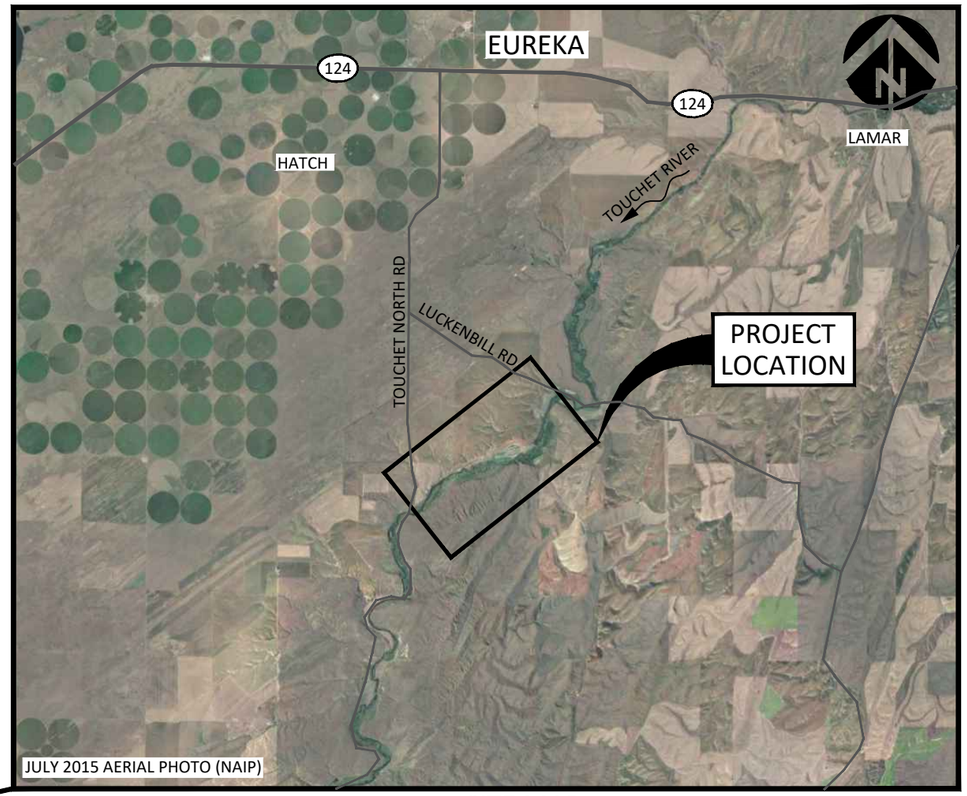
NOV 30, 2022



LOCATION MAP
STATE OF WASHINGTON
NOT TO SCALE



VICINITY MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

SHEET LIST	
1	COVER, SHEET INDEX & VICINITY MAP
2	GENERAL NOTES, QUANTITIES AND ABBREVIATIONS
3	HIP GENERAL CONSERVATION MEASURES (1 OF 3)
4	HIP GENERAL CONSERVATION MEASURES (2 OF 3)
5	HIP GENERAL CONSERVATION MEASURES (3 OF 3)
6	EROSION CONTROL DETAILS
7	EXISTING CONDITIONS AND SURVEY CONTROL
8	SHEET INDEX, ACCESS & STAGING
9	PROPOSED CONDITIONS (1 OF 6)
10	PROPOSED CONDITIONS (2 OF 6)
11	PROPOSED CONDITIONS (3 OF 6)
12	PROPOSED CONDITIONS (4 OF 6)
13	PROPOSED CONDITIONS (5 OF 6)
14	PROPOSED CONDITIONS (6 OF 6)
15	HOLDING POND
16	PROFILE
17	TYPICAL SECTIONS
18	TYPICAL DETAILS - LARGE WOOD STRUCTURES
19	TYPICAL DETAILS - LARGE WOOD STRUCTURES
20	TYPICAL DETAILS - LIVE WILLOW & COTTONWOOD CUTTINGS AND SALVAGE
21	REVEGETATION DETAILS, SEED MIX & PLANTING TABLES

COORDINATES:
LATITUDE: 46°13'40.01"N
LONGITUDE:118°34'51.88"W

COUNTY: WALLA WALLA
SECTION 32, TOWNSHIP 9N, RANGE 34E

WATERBODY: TOUCHET RIVER
TRIBUTARY OF: WALLA WALLA RIVER

NO.	BY	DATE	REVISION DESCRIPTION

SP, NS	JG, EA	JG, EA
DRAWN	DESIGNED	CHECKED
-	NOV 30, 2022	
APPROVED	DATE	PROJECT

CONFEDERATED TRIBES OF THE UMATILLA
TÚUŠI WÁNA FLOODPLAIN ENHANCEMENT
PRELIMINARY DESIGN

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

COVER, SHEET INDEX & VICINITY MAP

SHEET
1 OF 21

THE CONTRACTOR SHALL ATTEND A MANDATORY PRE-BID SITE MEETING.

THE CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH THE OWNER PRIOR TO BEGINNING CONSTRUCTION.

ALL WORK SHALL CONFORM TO THE CURRENT EDITIONS OF STANDARD PLANS AND SPECIFICATIONS OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT), AND LOCAL STANDARDS UNLESS INDICATED OTHERWISE BY THE CONTRACT DOCUMENTS.

EXISTING DATA

TOPOGRAPHIC AND BATHYMETRIC SURVEY DATA WERE COLLECTED BY INTER-FLUVE STAFF USING RTK GPS EQUIPMENT ON MAY 17 & 18, 2022. DATA ARE REFERENCED TO NAD83 WASHINGTON STATE PLANE, SOUTH ZONE, US SURVEY FEET, NAVD88.

LIDAR DATA FLOWN IN 2018 BY QUANTUM SPATIAL AND ACCESSED VIA THE WASHINGTON LIDAR PORTAL WAS USED TO SUPPLEMENT TOPOGRAPHIC SURVEY DATA TO DEVELOP DIGITAL ELEVATION MODELS.

EXISTING CONTOURS SHOWN ARE A COMPOSITE OF THE LIDAR AND GROUND SURVEY DATA.

PROPERTY BOUNDARIES SHOWN FROM WALLA WALLA COUNTY GIS SERVICES, DOWNLOADED JUNE 2022.

AERIAL PHOTOS DISPLAYED INCLUDE NAIP IMAGERY FROM JUNE 2021 AND DRONE IMAGERY FROM MAY 2022. RIVER MILES SHOWN ARE FROM USGS QUAD MAPS WITH TENTHS INTERPOLATED TO FIT. STATIONING STARTS AT RIVER MILE 14 AND PROGRESSES UPSTREAM FOLLOWING THE CHANNEL CENTER LINE AS OF MAY 2022.

SOILS

THE PROJECT SITE IS ASSUMED TO CONSIST OF ESQUATZEL SILT LOAM, 0 TO 3 PERCENT SLOPES; ONYX SILT LOAM, 0 TO 3 PERCENT SLOPES; RITZVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES; BASALT ROCKLAND, VERY STEEP SLOPES; AND RIVERWASH, AS MAPPED BY NRCS. CONTRACTOR SHALL CONDUCT SUBSURFACE INVESTIGATIONS AT OWN EXPENSE IF ADDITIONAL DATA IS REQUIRED.

BPA HIP

THIS PROJECT WAS DESIGNED IN ACCORDANCE WITH THE BPA HABITAT IMPROVEMENT PROGRAM (HIP), PROGRAMMATIC BIOLOGICAL OPINION. HIP GENERAL CONSERVATION MEASURES (CMs) ARE INCLUDED ON SHEETS 3 - 5. SITE SPECIFIC DIRECTION IS INCLUDED IN THE FOLLOWING GENERAL NOTES. ANY VARIANCES FROM HIP CMs WILL BE REQUESTED BY OWNER. IN CASE OF A CONFLICT BETWEEN THE REGULATORY STANDARDS OR SPECIFICATIONS, THE MORE STRINGENT WILL PREVAIL, UNLESS SPECIFIED IN WRITING BY THE OWNER.

CONSTRUCTION TIMING

ALL IN-WATER CONSTRUCTION WORK SHALL OCCUR WITHIN THE DESIGNATED IN-WATER WORK WINDOW.

EROSION CONTROL

CONTRACTOR SHALL BE SOLELY RESPONSIBLE, AT OWN EXPENSE, FOR PROVIDING AND MAINTAINING ALL NECESSARY EROSION CONTROL FACILITIES TO COMPLY WITH APPLICABLE EROSION CONTROL REGULATIONS AND TO MAINTAIN CLEAN ACCESS ROUTES. SEE HIP GENERAL AQUATIC CONSERVATION MEASURES FOR ADDITIONAL REQUIREMENTS.

EROSION CONTROL SEED MIX

STAGING AREAS, TEMPORARY ACCESS ROUTES, GRADING ARES AND LIVE STAKE REVEGETATION ZONES TO BE SEEDED AND MULCHED. SEE SHEET 21 FOR SEED MIX.

FISH SALVAGE

TO BE COMPLETED BY EXPERIENCED FISH BIOLOGIST AND COORDINATED WITH OWNER. SEE HIP GENERAL AQUATIC CONSERVATION MEASURES FOR ADDITIONAL REQUIREMENTS.

EQUIPMENT

SEE HIP GENERAL CONSERVATION MEASURES.

CULTURAL RESOURCES

IF YOUR WORK BRINGS YOU INTO CONTACT WITH ANY OF THE FOLLOWING CULTURAL RESOURCES:

-NATIVE AMERICAN CULTURAL ARTIFACTS (EXAMPLE: FLAKES, ARROWHEADS, STONE TOOLS, BONE TOOLS, POTTERY, ETC)

-HISTORIC ERA ARTIFACTS (EXAMPLE: BUILDING FOUNDATIONS, HOMESTEADS, SHIPWRECKS, MINING CAMPS, ETC)

-HUMAN SKELETAL REMAINS AND BONE FRAGMENTS

YOU MUST IMMEDIATELY DISCONTINUE ALL GROUND-DISTURBING ACTIVITY. DO NOT TOUCH OR MOVE THE OBJECTS AND MAINTAIN THE CONFIDENTIALITY OF THE SITE. FOLLOW THE PROCEDURES LISTED IN THE BPA INADVERTENT DISCOVERY PROCEDURE AND AWAIT FURTHER DIRECTION FROM BPA'S CULTURAL RESOURCES STAFF.

NAME	OFFICE #	CELL #
JENNA PETERSON	(503)230-3018	N/A
KURT PERKINS	(503)230-4454	(503)459-0436
SUNSHINE SCHMIDT	(503)230-5015	(503)804-1815

WETLANDS AND WATERS OF THE US

THE ORDINARY HIGH WATER (OHW) LINES DISPLAYED IN THIS DESIGN PACKAGE ARE DETERMINED BY INTER-FLUVE STAFF. THE ORDINARY HIGH WATER (OHW) LINE SHOWN IS APPROXIMATED BY THE MODELED 2-YEAR RETURN PERIOD DISCHARGE (2,048 CFS) INUNDATION EXTENT FOR EXISTING CONDITIONS.

NO WETLAND DELINEATION HAS BEEN PERFORMED AT THE PROJECT SITE.

THESE DO NOT NECESSARILY REPRESENT JURISDICTIONAL BOUNDARIES. WITHIN THE STATE OF WASHINGTON, THE ARMY CORPS OF ENGINEERS AND THE DEPARTMENT OF ECOLOGY HAVE THE FINAL AUTHORITY IN DETERMINING WATERS AND WETLAND BOUNDARIES AND REGULATIONS.

UTILITIES

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR HAVING UTILITIES LOCATED PRIOR TO CONSTRUCTION ACTIVITIES.

THE CONTRACTOR SHALL CALL (800-424-5555) FOR UTILITY LOCATE PRIOR TO CONSTRUCTION.

THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE EFFECTED UTILITY SERVICE TO REPORT ANY DAMAGED OR DESTROYED UTILITIES.

THE CONTRACTOR SHALL PROVIDE EQUIPMENT AND LABOR TO AID THE EFFECTED UTILITY SERVICE IN REPAIRING DAMAGED OR DESTROYED UTILITIES AT NO ADDITIONAL COST TO OWNER OR PROJECT SPONSOR.

CONSTRUCTION STAKING

CONTRACTOR SHALL STAKE LOG STRUCTURE LOCATIONS AND INSTALL GRADE STAKES AND ELEVATION CONTROL POINTS. SOME FIELD ADJUSTMENTS TO THE LINES AND GRADES ARE TO BE EXPECTED.

CONTRACTOR SHALL MEET WITH THE OWNER TO DEFINE AND MARK ACCESS ROUTES AND LIMITS OF DISTURBANCE PRIOR TO MOBILIZATION OF EQUIPMENT OR MATERIALS ONTO THE SITE.

THE CONTRACTOR SHALL REPLACE DAMAGED OR DESTROYED CONSTRUCTION STAKES AT NO ADDITIONAL COST TO OWNER OR PROJECT SPONSOR.

CONSTRUCTION ACCESS

CONTRACTOR SHALL SUBMIT AN ACCESS, STAGING, AND STOCKPILE PLAN TO THE OWNER FOR APPROVAL.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING ANY REQUIRED TRAFFIC CONTROL INCLUDING, BUT NOT LIMITED TO, SIGNAGE AND FLAGGERS; AND FOR OBTAINING ANY REQUIRED ACCESS PERMITS.

FOR DURATION OF PROJECT, CONTRACTOR SHALL KEEP ALL PRIVATE AND PUBLIC ROADS USED FOR ACCESS FREE OF DEBRIS AND MUD.

SEE SHEETS 3-5, HIP GENERAL CONSERVATION MEASURES FOR ADDITIONAL REQUIREMENTS.

JURISDICTIONAL PERMIT QUANTITIES

ACTIVITY	WATERBODY NAME	IMPACT LOCATION	DURATION OF IMPACT	MATERIAL	AMOUNT OF MATERIAL (CY) TO BE REMOVED FROM/ PLACED WITHIN WATERBODY	AREA (SF) OF WATERBODY DIRECTLY AFFECTED
EXCAVATION - INSTALLATION OF LARGE WOOD STRUCTURES	TOUCHET RIVER (TÚUŠI WÁNA)	WITHIN WATERBODY (BELOW OHW)	PERMANENT	NATIVE SOIL	30,000 LOCAL CUT & FILL WITHIN THE OHW	85,000 WITHIN THE OHW
EXCAVATION - INSTALLATION OF WILLOW BAFFLES	TOUCHET RIVER (TÚUŠI WÁNA)	ADJACENT TO WATERBODY - ABOVE OHW & WITHIN 100-YEAR FLOODPLAIN	TEMPORARY	NATIVE SOIL	6,500 LOCAL CUT & FILL OUTSIDE THE OHW	30,000 OUTSIDE THE OHW
BERM EXCAVATION	TOUCHET RIVER (TÚUŠI WÁNA)	ADJACENT TO WATERBODY - ABOVE OHW & WITHIN 100-YEAR FLOODPLAIN	PERMANENT	NATIVE SOIL	7,630 CUT OUTSIDE THE OHW	50,000 OUTSIDE THE OHW
LARGE WOOD PLACEMENT	TOUCHET RIVER (TÚUŠI WÁNA)	ADJACENT TO WATERBODY - ABOVE OHW & WITHIN 100-YEAR FLOODPLAIN	PERMANENT	LARGE WOOD	2,200	134,700
LARGE WOOD PLACEMENT	TOUCHET RIVER (TÚUŠI WÁNA)	WITHIN WATERBODY (BELOW OHW)	PERMANENT	LARGE WOOD	2,400	91,800

NO.	BY	DATE	REVISION DESCRIPTION

SP, NS — DRAWN | JG, EA — DESIGNED | JG, EA — CHECKED
- — APPROVED | NOV 30, 2022 — DATE | — PROJECT

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GENERAL NOTES, QUANTITIES AND ABBREVIATIONS

HIP GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

THE ACTIVITIES COVERED UNDER THE HIP ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USFWS AND NMFS) WILL BE APPLIED TO ALL ACTIONS OF THIS PROJECT.

PROJECT DESIGN AND SITE PREPARATION.

1. STATE AND FEDERAL PERMITS.

A. ALL APPLICABLE REGULATORY PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION.

B. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, THE APPROPRIATE STATE AGENCY REMOVAL AND FILL PERMIT, USACE CLEAN WATER ACT (CWA) 404 PERMITS, CWA SECTION 401 WATER QUALITY CERTIFICATIONS, AND FEMA NO-RISE ANALYSES.

2. TIMING OF IN-WATER WORK.

A. APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.

B. CHANGES TO ESTABLISHED WORK WINDOWS WILL BE APPROVED BY REGIONAL STATE BIOLOGISTS AND BPA'S EC LEAD.

C. BULL TROUT. FOR AREAS WITH DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR AREAS KNOWN TO HAVE BULL TROUT, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.

D. LAMPREY. WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY WILL BE AVOIDED FROM MARCH 1 TO JULY 1 FOR REACHES <5,000 FEET IN ELEVATION AND FROM MARCH 1 TO AUGUST 1 FOR REACHES >5,000 FEET. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE PROCEDURES (SEE FISH SALVAGE AND ELECTROFISHING SECTIONS) TO MINIMIZE ADVERSE EFFECTS.

E. THE IN-WATER WORK WINDOW WILL BE PROVIDED IN THE CONSTRUCTION PLANS.

3. CONTAMINANTS.

A. EXCAVATION OF MORE THAN 20 CUBIC YARDS WILL REQUIRE A SITE VISIT AND DOCUMENTED ASSESSMENT FOR POTENTIAL CONTAMINANT SOURCES. THE SITE ASSESSMENT WILL BE STORED WITH PROJECT FILES OR AS AN APPENDIX TO THE BASIS OF DESIGN REPORT.

B. THE SITE ASSESSMENT WILL SUMMARIZE:

1. THE SITE VISIT, CONDITION OF THE PROPERTY, AND IDENTIFICATION OF ANY AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES;
2. AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
3. INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
4. THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION SOURCES.

4. SITE LAYOUT AND FLAGGING.

A. CONSTRUCTION AREAS TO BE CLEARLY FLAGGED PRIOR TO CONSTRUCTION.

B. AREAS TO BE FLAGGED WILL INCLUDE:

1. SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;
2. EQUIPMENT ENTRY AND EXIT POINTS;
3. ROAD AND STREAM CROSSING ALIGNMENTS;
4. STAGING, STORAGE, AND STOCKPILE AREAS; AND
5. NO-SPRAY AREAS AND BUFFERS.

5. TEMPORARY ACCESS ROADS AND PATHS.

A. EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED.

B. VEHICLE USE AND HUMAN ACTIVITIES, INCLUDING WALKING, IN AREAS OCCUPIED BY TERRESTRIAL ESA-LISTED SPECIES WILL BE MINIMIZED.

C. TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THEN THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.

D. THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).

E. AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED, AND THE SOIL WILL BE STABILIZED AND REVEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES DECOMPACTING THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPING TO MATCH THE ORIGINAL CONTOUR.

F. HELICOPTER FLIGHT PATTERNS WILL BE ESTABLISHED IN ADVANCE AND LOCATED TO AVOID TERRESTRIAL ESA-LISTED SPECIES AND THEIR OCCUPIED HABITAT DURING SENSITIVE LIFE STAGES.

6. TEMPORARY STREAM CROSSINGS.

A. EXISTING STREAM CROSSINGS OR BEDROCK WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.

B. TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION. TREATED WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR DIRECTLY OVER WATER.

C. FOR PROJECTS THAT REQUIRE EQUIPMENT AND VEHICLES TO CROSS IN THE WET:

1. THE LOCATION AND NUMBER OF ALL WET CROSSINGS SHALL BE APPROVED BY THE BPA EC LEAD AND DOCUMENTED IN THE CONSTRUCTION PLANS;
2. VEHICLES AND MACHINERY SHALL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHENEVER POSSIBLE;
3. NO STREAM CROSSINGS WILL OCCUR 300 FEET UPSTREAM OR 100 FEET DOWNSTREAM OF AN EXISTING REDD OR SPAWNING FISH; AND
4. AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND BANKS RESTORED.

7. STAGING, STORAGE, AND STOCKPILE AREAS.

A. STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND. STAGING AREAS CLOSER THAN 150 FEET WILL BE APPROVED BY THE EC LEAD.

B. NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN 150 FEET IF CLEARLY INDICATED IN THE PLANS THAT AREA IS FOR NATURAL MATERIALS ONLY.

C. ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.

D. ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE DISPOSED OF OUTSIDE THE 100-YEAR FLOODPLAIN.

8. EQUIPMENT.

A. MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G., MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS).

B. EQUIPMENT WILL BE STORED, FUELED, AND MAINTAINED IN AN CLEARLY IDENTIFIED STAGING AREA THAT MEETS STAGING AREA CONSERVATION MEASURES.

C. EQUIPMENT WILL BE REFUELED IN A VEHICLE STAGING AREA OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES ONLY TO GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS).

D. BIODEGRADABLE LUBRICANTS AND FLUIDS WILL BE USED ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER.

E. EQUIPMENT WILL BE INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND.

F. EQUIPMENT WILL BE THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMAIN GREASE FREE.

9. EROSION CONTROL.

A. TEMPORARY EROSION CONTROL MEASURES INCLUDE:

1. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWNSLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE;
2. IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION;
3. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE SEDGE MATS, FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC;
4. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS WEED FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION;
5. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL; AND
6. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.

B. EMERGENCY EROSION CONTROLS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:

1. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
2. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

10. DUST ABATEMENT.

A. THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES.

B. WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.

C. DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR A STREAM CHANNEL AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING MIXED 50:50 WITH WATER.

D. APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER, AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT MATERIALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A WATERBODY OR STREAM CHANNEL; DISTANCES MAY BE GREATER WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).

E. SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.

F. PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

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\- — APPROVED | NOV 30, 2022 — DATE | — PROJECT

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PRELIMINARY DESIGN

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HIP GENERAL CONSERVATION MEASURES (1 OF 3)

SHEET
3 OF 21

PROJECT DESIGN AND SITE PREPARATION (CONTINUED).

11. SPILL PREVENTION, CONTROL, AND COUNTER MEASURES.

A. A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.

B. WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.

C. SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIALS USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.

D. WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.

E. ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPAULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.

F. PUMPS USED ADJACENT TO WATER SHALL USE SPILL CONTAINMENT SYSTEMS.

12. INVASIVE SPECIES CONTROL.

A. PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER WASHED, ALLOWED TO FULLY DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.

B. WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.

C. WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES UNLESS DECONTAMINATION PROCEDURES HAVE BEEN APPROVED BY THE EC LEAD.

WORK AREA ISOLATION AND FISH SALVAGE.

1. WORK AREA ISOLATION.

A. ANY WORK AREA WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA-LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300-FEET UPSTREAM FROM KNOWN SPAWNING HABITATS.

B. WORK AREA ISOLATION AND FISH SALVAGE ACTIVITIES WILL COMPLY WITH THE IN-WATER WORK WINDOW.

C. DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS AND AREAS (COFFER DAMS, PUMPS, DISCHARGE AREAS, FISH SCREENS, FISH RELEASE AREAS, ETC.).

D. WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.

2. FISH SALVAGE.

A. MONITORING AND RECORDING WILL TAKE PLACE FOR DURATION OF SALVAGE. THE SALVAGE REPORT WILL BE COMMUNICATED TO AGENCIES VIA THE PROJECT COMPLETION FORM (PCF).

B. SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING CONDITIONS TO MINIMIZE STRESS TO FISH SPECIES, TYPICALLY PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES WHICH OCCUR IN THE MORNING VERSUS LATE IN THE DAY.

C. SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODS, AND CONSERVATION MEASURES SPECIFIED BELOW:

1. SLOWLY REDUCE WATER FROM THE WORK AREA TO ALLOW SOME FISH TO LEAVE VOLITIONALLY.
2. BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.
3. BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH AS LONG AS PASSAGE REQUIREMENTS ARE MET.
4. NETS WILL BE MONITORED HOURLY DURING IN-STREAM DISTURBANCE.
5. IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED AND FREE OF ORGANIC ACCUMULATION. IF BULL TROUT ARE PRESENT, NETS ARE TO BE CHECKED EVERY 4 HOURS FOR FISH IMPINGEMENT.
6. CAPTURE FISH THROUGH SEINING AND RELOCATE TO STREAMS.
7. WHILE DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.
8. SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.
9. MINNOW TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.
10. ELECTROFISH TO CAPTURE AND RELOCATED FISH NOT CAUGHT DURING SEINING PER ELECTROFISH CONSERVATION MEASURES.
11. CONTINUE TO SLOWLY DEWATER STREAM REACH.
12. COLLECT ANY REMAINING FISH IN COLD-WATER BUCKETS AND RELOCATED TO THE STREAM.
13. LIMIT THE TIME FISH ARE IN A TRANSPORT BUCKET.
14. MINIMIZE PREDATION BY TRANSPORTING COMPARABLE SIZES IN BUCKETS.
15. BUCKET WATER TO BE CHANGED EVERY 15 MINUTES OR AERATED.
16. BUCKETS WILL BE KEPT IN SHADED AREAS OR COVERED.
17. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT ON THE STREAM BANK TO AVOID MORTALITY COUNTING ERRORS.

D. SALVAGE GUIDELINES FOR BULL TROUT, LAMPREY, MUSSELS, AND NATIVE FISH.

1. CONDUCT SITE SURVEY TO ESTIMATE SALVAGE NUMBERS.
2. PRE-SELECT SITE(S) FOR RELEASE AND/OR MUSSEL BED RELOCATION.
3. SALVAGE OF BULL TROUT WILL NOT TAKE PLACE WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.
4. IF DRAWDOWN LESS THAN 48 HOURS, SALVAGE OF LAMPREY AND MUSSELS MAY NOT BE NECESSARY IF TEMPERATURES SUPPORT SURVIVAL IN SEDIMENTS.
5. SALVAGE MUSSELS BY HAND, LOCATING BY SNORKELING OR WADING.
6. SALVAGE LAMPREY BY ELECTROFISHING (SEE ELECTROFISHING FOR LARVAL LAMPREY SETTINGS AND LARVAL LAMPREY DRY SHOCKING SETTINGS).
7. SALVAGE BONY FISH AFTER LAMPREY WITH NETS OR ELECTROFISHING (SEE ELECTROFISHING FOR APPROPRIATE SETTINGS).
8. REGULARLY INSPECT DEWATERED SITE SINCE LAMPREY LIKELY TO EMERGE AFTER DEWATERING AND MUSSELS MAY BECOME VISIBLE.
9. MUSSELS MAY BE TRANSFERRED IN COOLERS.
10. MUSSELS WILL BE PLACED INDIVIDUALLY TO ENSURE ABILITY TO BURROW INTO NEW HABITAT.

3. ELECTROFISHING.

A. INITIAL SITE SURVEY AND INITIAL SETTINGS.

1. IDENTIFY SPAWNING ADULTS AND ACTIVE REDDS TO AVOID.
2. RECORD WATER TEMPERATURE. ELECTROFISHING WILL NOT OCCUR WHEN WATER TEMPERATURES ARE ABOVE 18 DEGREES CELSIUS.
3. IF POSSIBLE, A BLOCK NET WILL BE PLACED DOWNSTREAM AND CHECKED REGULARLY TO CAPTURE STUNNED FISH THAT DRIFT DOWNSTREAM.
4. INITIAL SETTINGS WILL BE 100 VOLTS, PULSE WIDTH OF 500 MICRO SECONDS, AND PULSE RATE OF 30 HERTZ.
5. RECORDS FOR CONDUCTIVITY, WATER TEMPERATURE, AIR TEMPERATURE, ELECTROFISHING SETTINGS, ELECTROFISHER MODEL, ELECTROFISHER CALIBRATION, FISH CONDITIONS, FISH MORTALITIES, AND TOTAL CAPTURE RATES WILL BE INCLUDED IN THE SALVAGE LOG BOOK.

B. ELECTROFISHING TECHNIQUE.

1. SAMPLING WILL BEGIN USING STRAIGHT DC. POWER WILL REMAIN ON UNTIL THE FISH IS NETTED WHEN USING STRAIGHT DC. GRADUALLY INCREASE VOLTAGE WHILE REMAINING BELOW MAXIMUM LEVELS.
2. MAXIMUM VOLTAGE WILL BE 1100 VOLTS WHEN CONDUCTIVITY IS <100 MILLISECONDS, 800 VOLTS WHEN CONDUCTIVITY IS BETWEEN 100 AND 300 MILLISECONDS, AND 400 VOLTS WHEN CONDUCTIVITY IS >300 MILLISECONDS.
3. IF FISH CAPTURE IS NOT SUCCESSFUL USING STRAIGHT DC, THE ELECTROFISHER WILL BE SET TO INITIAL VOLTAGE FOR PDC. VOLTAGE, PULSE WIDTH, AND PULSE FREQUENCY WILL BE GRADUALLY INCREASED WITHIN MAXIMUM VALUES UNTIL CAPTURE IS SUCCESSFUL.
4. MAXIMUM PULSE WIDTH IS 5 MILLISECONDS. MAXIMUM PULSE RATE IS 70 HERTZ
5. ELECTROFISHING WILL NOT OCCUR IN ONE AREA FOR AN EXTENDED PERIOD.
6. THE ANODE WILL NOT INTENTIONALLY COME INTO CONTACT WITH FISH. THE ZONE FOR POTENTIAL INJURY OF 0.5 M FROM THE ANODE WILL BE AVOIDED.
7. SETTINGS WILL BE LOWERED IN SHALLOWER WATER SINCE VOLTAGE GRADIENTS LIKELY TO INCREASE.
8. ELECTROFISHING WILL NOT OCCUR IN TURBID WATER WHERE VISIBILITY IS POOR (I.E. UNABLE TO SEE THE BED OF THE STREAM).
9. OPERATIONS WILL IMMEDIATELY STOP IF MORTALITY OR OBVIOUS FISH INJURY IS OBSERVED. ELECTROFISHING SETTINGS WILL BE REEVALUATED.

C. SAMPLE PROCESSING.

1. FISH SHALL BE SORTED BY SIZE TO AVOID PREDATION DURING CONTAINMENT.
2. SAMPLERS WILL REGULARLY CHECK CONDITIONS OF FISH HOLDING CONTAINERS, AIR PUMPS, WATER TRANSFERS, ETC.
3. FISH WILL BE OBSERVED FOR GENERAL CONDITIONS AND INJURIES
4. EACH FISH WILL BE COMPLETELY REVIVED BEFORE RELEASE. ESA-LISTED SPECIES WILL BE PRIORITIZED FOR SUCCESSFUL RELEASE.

D. BULL TROUT ELECTROFISHING.

1. ELECTROFISHING FOR BULL TROUT WILL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. IN FMO HABITATS ELECTROFISHING MAY OCCUR ANY TIME.
2. ELECTROFISHING OF BULL TROUT WILL NOT OCCUR WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.

E. LARVAL LAMPREY ELECTROFISHING.

1. PERMISSION FROM EC LEAD WILL BE OBTAINED IF LARVAL LAMPREY ELECTROFISHER IS NOT ONE OF FOLLOWING PRE-APPROVED MODELS: ABP-2 "WISCONSIN", SMITH-ROOT LR-24, OR SMITH-ROOT APEX BACKPACK.
2. LARVAL LAMPREY SAMPLING WILL INCORPORATE 2-STAGE METHOD: "TICKLE" AND "STUN".
3. FIRST STAGE: USE 125 VOLT DC WITH A 25 PERCENT DUTY CYCLE APPLIED AT A SLOW RATE OF 3 PULSES PER SECOND. IF TEMPERATURES ARE BELOW 10 DEGREES CELSIUS, VOLTAGE MAY BE INCREASED GRADUALLY (NOT TO EXCEED 200 VOLTS). BURSTED PULSES (THREE SLOW AND ONE SKIPPED) RECOMMENDED TO INCREASE EMERGENCE.
4. SECOND STAGE (OPTIONAL FOR EXPERIENCED NETTERS): IMMEDIATELY AFTER LAMPREY EMERGE, USE A FAST PULSE SETTING OF 30 PULSES PER SECOND.
5. USE DIP NETS FOR VISIBLE LAMPREY. SIENES AND FINE MESH NET SWEEPS MAY BE USED IN POOR VISIBILITY.

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HIP GENERAL CONSERVATION MEASURES (2 OF 3)

SHEET
4 OF 21

WORK AREA ISOLATION AND FISH SALVAGE (CONTINUED).

6. SAMPLING WILL OCCUR SLOWLY (>60 SECONDS PER METER) STARTING AT UPSTREAM AND WORKING DOWNSTREAM.

7. MULTIPLE SWEEPS TO OCCUR WITH 15 MINUTES BETWEEN SWEEPS.

8. POST-DRAWDOWN "DRY-SHOCKING" WILL BE APPLIED IF LARVAL LAMPREY CONTINUE TO EMERGE. ANODES TO BE PLACED ONE METER APART TO SAMPLE ONE SQUARE METER AT A TIME FOR AT LEAST 60 SECONDS. FOR TEMPERATURES LESS THAN 10 DEGREES CELSIUS, MAXIMUM VOLTAGE MAY BE GRADUALLY INCREASED TO 400 VOLTS (DRY-SHOCKING ONLY).

4. DEWATERING.

A. DEWATERING WILL OCCUR AT A RATE SLOW ENOUGH TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA.

B. WHERE A GRAVITY FEED DIVERSION IS NOT POSSIBLE, A PUMP MAY BE USED. PUMPS WILL BE INSTALLED TO AVOID REPETIVE DEWATERING AND REWATERING.

C. WHEN FISH ARE PRESENT, PUMPS WILL BE SCREENED IN ACCORDANCE WITH NMFS FISH SCREEN CRITERIA. NMFS ENGINEERING REVIEW AND APPROVAL WILL BE OBTAINED FOR PUMPS EXCEEDING 3 CUBIC FEET PER SECOND.

D. DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO THE STREAM CHANNEL AND RIPARIAN VEGETATION.

E. SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OF INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL AND VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

CONSTRUCTION AND POST CONSTRUCTION CONSERVATION MEASURES.

1. FISH PASSAGE.

A. FISH PASSAGE WILL BE PROVIDED FOR ADULT AND JUVENILE FISH LIKELY TO BE PRESENT DURING CONSTRUCTION UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION, THE STREAM IS NATURALLY IMPASSABLE, OR PASSAGE WILL NEGATIVELY IMPACT ESA-LISTED SPECIES OR THEIR HABITAT.

B. FISH PASSAGE ALTERNATIVES WILL BE APPROVED BY THE BPA EC LEAD UNDER ADVISEMENT BY THE NMFS HABITAT BIOLOGIST.

2. CONSTRUCTION AND DISCHARGE WATER.

A. SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.

B. DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.

C. CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS, AND OTHER POLLUTANTS.

3. TIME AND EXTENT OF DISTURBANCE.

A. EARTHWORK REQUIRING IN-STREAM MECHANIZED EQUIPMENT (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING, AND COMPACTING) WILL BE COMPLETED AS QUICKLY AS POSSIBLE.

B. MECHANIZED EQUIPMENT WILL WORK FROM TOP OF BANK UNLESS WORK FROM ANOTHER LOCATION WILL RESULT IN LESS HABITAT DISTURBANCE (TURBIDITY, VEGETATION DISTURBANCE, ETC.).

4. CESSATION OF WORK.

A. PROJECT OPERATIONS WILL CEASE WHEN HIGH FLOW CONDITIONS MAY RESULT IN INUNDATION OF THE PROJECT AREA (FLOOD EFFORTS TO DECREASE DAMAGES TO NATURAL RESOURCES PERMITTED).

B. WATER QUALITY LEVELS EXCEEDED. SEE CWA SECTION 401 WATER QUALITY CERTIFICATION AND TURBIDITY MEASURES.

5. SITE RESTORATION.

A. DISTURBED AREAS, STREAM BANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED TO IMPROVED OR PRE-PROJECT CONDITIONS.

B. PROJECT-RELATED WASTE WILL BE REMOVED.

C. TEMPORARY ACCESS ROADS AND STAGING WILL BE DECOMPACTED AND RESTORED. SOILS WILL BE LOOSENED IF NEEDED FOR REVEGETATION OR WATER INFILTRATION.

D. THE PROJECT SPONSOR WILL RETAIN THE RIGHT OF REASONABLE ACCESS TO THE SITE TO MONITOR AND MAINTAIN THE SITE OVER THE LIFE OF THE PROJECT.

6. REVEGETATION.

A. PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.

B. A MIX OF NATIVE SPECIES (INVASIVE SPECIES NOT ALLOWED) APPROPRIATE TO THE SITE WILL BE USED TO REESTABLISH VEGETATION, PROVIDE SHADE, AND REDUCE EROSION. REESTABLISHED VEGETATION SHOULD BE AT LEAST 70% OF PRE-PROJECT CONDITIONS WITHIN THREE YEARS.

C. VEGETATION SUCH AS WILLOWS, SEDGES, OR RUSH MATS WILL BE SALVAGED FROM DISTURBED OR ABANDONED AREAS TO BE REPLANTED.

D. SHORT-TERM STABILIZATION MEASURE MAY INCLUDE THE USE OF NON-NATIVE STERILE SEED MIX (WHEN NATIVE NOT AVAILABLE), WEED-FREE CERTIFIED STRAW, OR OTHER SIMILAR TECHNIQUES.

E. SURFACE FERTILIZER WILL NOT BE APPLIED WITHIN 50 FEET OF ANY STREAM, WATE BODY, OR WETLAND.

F. FENCING WILL BE INSTALLED AS NECESSARY TO PREVENT ACCESS TO REVEGETATED SITES BY LIVESTOCK OR UNAUTHORIZED PERSONS.

G. INVASIVE PLANTS WILL BE REMOVED OR CONTROLLED UNTIL NATIVE PLANT SPECIES ARE WELL ESTABLISHED (TYPICALLY THREE YEARS POST-CONSTRUCTION).

7. SITE ACCESS AND IMPLEMENTATION MONITORING.

A. THE PROJECT SPONSOR WILL PROVIDE CONSTRUCTION MONITORING DURING IMPLEMENTATION TO ENSURE ALL CONSERVATION MEASURES ARE ADEQUATELY FOLLOWED, EFFECTS TO LISTED SPECIES ARE NOT GREATER THAN PREDICTED, AND INCIDENTAL TAKE LIMITATIONS ARE NOT EXCEEDED.

B. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL SUBMIT THE PROJECT COMPLETION FORM (PCF) WITHIN 30 DAYS OF PROJECT COMPLETION.

8. CWA SECTION 401 WATER QUALITY CERTIFICATION.

A. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL COMPLETE AND RECORD WATER QUALITY OBSERVATIONS (SEE TURBIDITY MONITORING) TO ENSURE IN-WATER WORK IS NOT DEGRADING WATER QUALITY.

B. DURING CONSTRUCTION, WATER QUALITY PROVISIONS PROVIDED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY, WASHINGTON DEPARTMENT OF ECOLOGY, IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY WILL BE FOLLOWED.

STAGED REWATERING PLAN.

A. WHEN REINTRODUCING WATER TO DEWATERED AREAS AND NEWLY CONSTRUCTED CHANNELS, A STAGED REWATERING PLAN WILL BE APPLIED.

B. THE FOLLOWING WILL BE APPLIED TO ALL REWATERING EFFORTS. COMPLEX REWATERING EFFORTS MAY REQUIRE ADDITIONAL NOTES OR A DEDICATED SHEET IN THE CONSTRUCTION DETAILS.

1. TURBIDITY MONITORING PROTOCOL WILL BE APPLIED TO REWATERING EFFORTS.

2. PRE-WASH THE AREA BEFORE REWATERING. TURBID WASH WATER WILL BE DETAINED AND PUMPED TO THE FLOODPLAIN OR SEDIMENT CAPTURE AREAS RATHER THAN DISCHARGING TO FISH-BEARING STREAMS.

3. INSTALL SEINE NETS AT UPSTREAM END TO PREVENT FISH FROM MOVING DOWNSTREAM UNTIL 2/3 OF TOTAL FLOW IS RESTORED TO THE CHANNEL.

4. STARTING IN EARLY MORNING INTRODUCE 1/3 OF NEW CHANNEL FLOW OVER PERIOD OF 1-2 HOURS.

5. INTRODUCE SECOND THIRD OF FLOW OVER NEXT 1 TO 2 HOURS AND BEGIN FISH SALVAGE OF BYPASS CHANNEL IF FISH ARE PRESENT.

6. REMOVE UPSTREAM SEINE NETS ONCE 2/3 FLOW IN REWATERED CHANNEL AND DOWNSTREAM TURBIDITY IS WITHIN ACCEPTABLE RANGE (LESS THAN 40 NTU OR LESS THAN 10% BACKGROUND).

7. INTRODUCE FINAL THIRD OF FLOW ONCE FISH SALVAGE EFFORTS ARE COMPLETE AND DOWNSTREAM TURBIDITY VERIFIED TO BE WITHIN ACCEPTABLE RANGE.

8. INSTALL PLUG TO BLOCK FLOW INTO OLD CHANNEL OR BYPASS. REMOVE ANY REMAINING SEINE NETS.

9. IN LAMPREY SYSTEMS, LAMPREY SALVAGE AND DRY SHOCKING MAY BE NECESSARY.

TURBIDITY MONITORING.

A. RECORD THE READING, LOCATION, AND TIME FOR THE BACKGROUND READING APPROXIMATELY 100 FEET UPSTREAM OF THE PROJECT AREA USING A RECENTLY CALIBRATED TURBIDIMETER OR VIA VISUAL OBSERVATION (SEE THE HIP HANDBOOK TURBIDITY MONITORING SECTION FOR A VISUAL OBSERVATION KEY).

B. RECORD THE TURBIDITY READING, LOCATION, AND TIME AT THE MEASUREMENT COMPLIANCE LOCATION POINT.

1. 50 FEET DOWNSTREAM FOR STREAMS LESS THAN 30 FEET WIDE.

2. 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE.

3. 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE.

4. 300 FEET FROM THE DISCHARGE POINT OR NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SCOUR.

C. TURBIDITY SHALL BE MEASURED (BACKGROUND LOCATION AND COMPLIANCE POINTS) EVERY 4 HOURS WHILE WORK IS BEING IMPLEMENTED.

D. IF THERE IS A VISIBLE DIFFERENCE BETWEEN A COMPLIANCE POINT AND THE BACKGROUND, THE EXCEEDANCE WILL BE NOTED IN THE PROJECT COMPLETION FORM (PCF). ADJUSTMENTS OR CORRECTIVE MEASURES WILL BE TAKEN IN ORDER TO REDUCE TURBIDITY.

E. IF EXCEEDANCES OCCUR FOR MORE THAN TWO CONSECUTIVE MONITORING INTERVALS (AFTER 8 HOURS), THE ACTIVITY WILL STOP UNTIL THE TURBIDITY LEVEL RETURNS TO BACKGROUND. THE BPA EC LEAD WILL BE NOTIFIED OF ALL EXCEEDANCES AND CORRECTIVE ACTIONS AT PROJECT COMPLETION.

F. IF TURBIDITY CONTROLS (COFFER DAMS, WADDLES, FENCING, ETC.) ARE DETERMINED INEFFECTIVE, CREWS WILL BE MOBILIZED TO MODIFY AS NECESSARY. OCCURRENCES WILL BE DOCUMENTED IN THE PROJECT COMPLETION FORM (PCF).

G. FINAL TURBIDITY READINGS, EXCEEDANCES, AND CONTROL FAILURES WILL BE SUBMITTED TO THE BPA EC LEAD USING THE PROJECT COMPLETION FORM (PCF).

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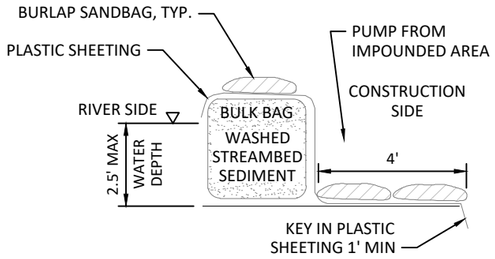
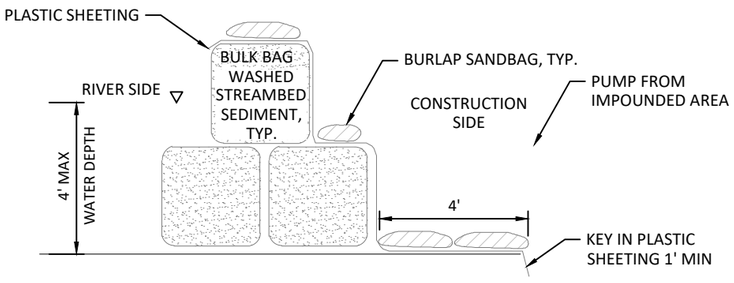
HIP GENERAL CONSERVATION MEASURES (3 OF 3)

SHEET 5 OF 21



WATER DEPTHS LESS THAN 2.5'



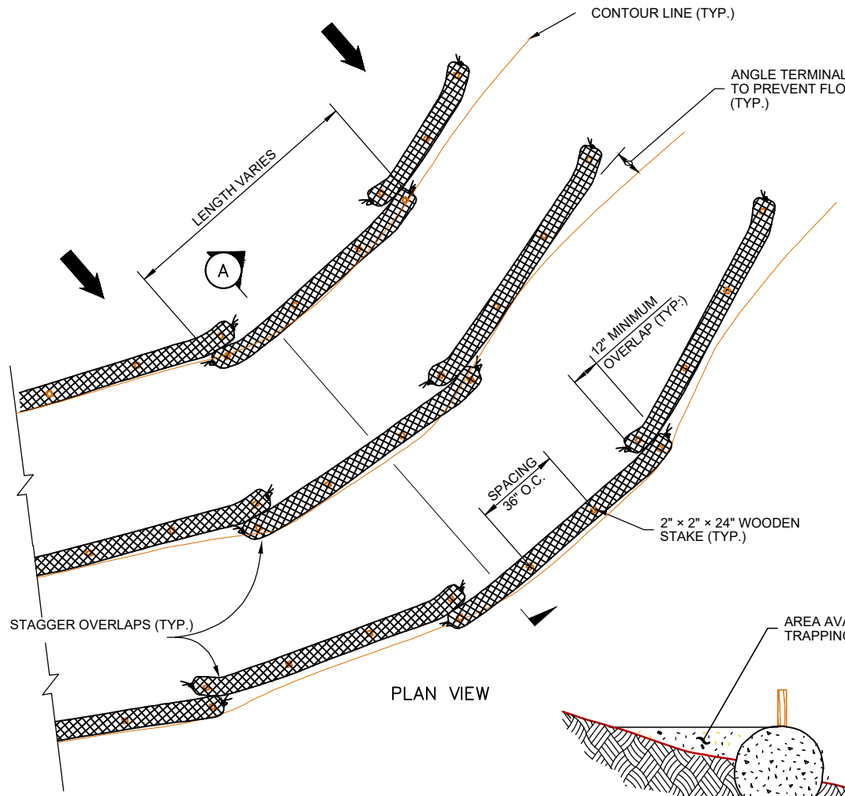
WATER DEPTHS GREATER THAN 2.5'

I - TYPICAL DETAIL - COFFERDAM

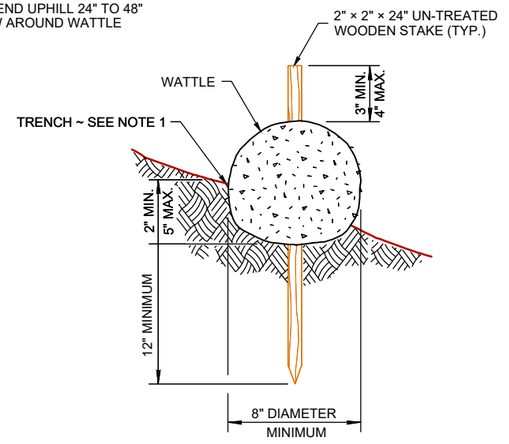
NOT TO SCALE

BULK BAG NOTES:

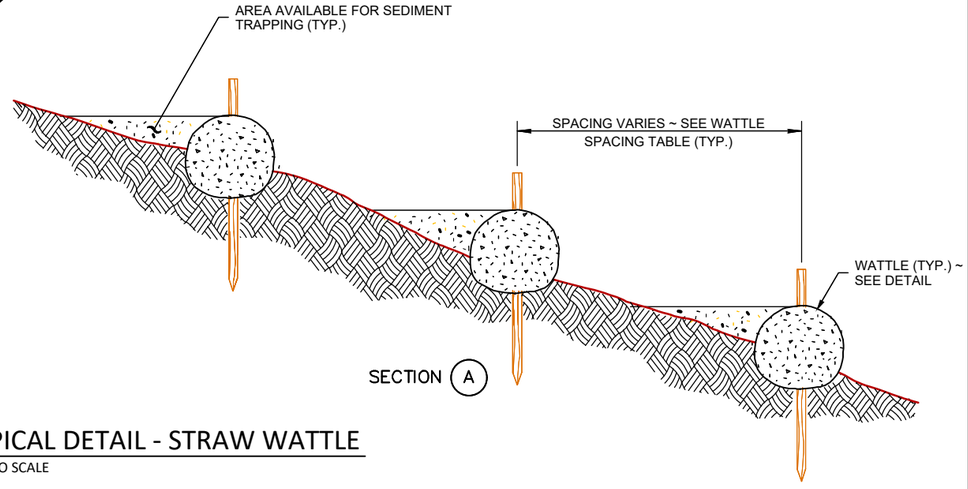
1. BULK BAG COFFERDAM SHALL BE CONSTRUCTED OF SEVERAL UNITS OF BULK BAGS FILLED WITH WASHED STREAMBED SEDIMENT (PER WSDOT 9-03.11(1) EXCEPT WITH NO MORE THAN 6 PERCENT PASSING THE NO. 4, NO MORE THAN 3 PERCENT PASSING THE NO. 40, AND NO MORE THAN 2 PERCENT PASSING THE NO. 200, AND ABUTTED SIDE BY SIDE TO CREATE A ROW THAT ISOLATES THE CONSTRUCTION SITE.
2. IF WATER DEPTH EXCEEDS 85% OF THE BULK BAG HEIGHT, AN ADDITIONAL TOP ROW OF BULK BAGS SHALL BE INSTALLED, SUPPORTED BY TWO BOTTOM ROWS OF BULK BAGS.
3. BULK BAG COFFERDAM SHALL BE SEALED BY COVERING THE COFFERDAM WITH PLASTIC SHEETING HELD IN PLACE BY STANDARD SANDBAGS PLACED IN ROWS ON TOP OF COFFERDAM, AND AT TOE OF COFFERDAM.
4. THE PLASTIC SHEETING SHALL BE DRAPED ALONG THE CHANNEL BOTTOM ON BOTH SIDES OF THE COFFERDAM WITH OUTWARD EDGE OF SHEETING MINIMUM 4-FEET FROM TOE OF COFFERDAM. THE DRAPED PORTION OF PLASTIC SHEETING SHALL BE PINNED TO THE CHANNEL BED BY MINIMUM TWO ROWS OF BURLAP SANDBAGS. SANDBAGS SHALL BE FILLED WITH PEA GRAVEL (PER WSDOT 9-03.12(4) GRAVEL BACKFILL FOR DRAINS).
5. THE CONSTRUCTION SIDE EDGE OF PLASTIC SHEETING SHALL BE TOED INTO THE CHANNEL BED MINIMUM 1-FT. TOEING IN THE OUTWARD EDGE OF PLASTIC SHEETING SHALL OCCUR AFTER THE COFFERDAM IS CLOSED TO PREVENT TURBIDITY RELEASE TO THE WATERWAY.
6. THE TERMINAL ENDS OF BULK BAG COFFERDAM, WHERE IT CONNECTS TO CHANNEL BANK OR HIGH GROUND, SHALL BE SEALED WITH PLASTIC SHEETING AND BURLAP SANDBAGS.
7. BULK BAGS SHALL BE ALL NEW CUBE-SHAPED WATERPROOF POLYPROPYLENE WOVEN FABRIC BAGS WITH FULLY OPEN TOP, FLAT BOTTOM, FOUR LOOPS, MINIMUM 2-TON WEIGHT CAPACITY, MINIMUM 5:1 SAFETY FACTOR.
8. PLASTIC SHEETING SHALL BE MINIMUM 6-MIL THICKNESS. ROLL LENGTH SHALL BE LONG ENOUGH TO ENSURE THAT ENTIRE LENGTH OF COFFERDAM WILL BE COVERED WITHOUT A SEAM. MINIMUM 12-FT WIDE ROLL SHALL BE USED FOR SINGLE LAYER BULK BAG COFFERDAM. MINIMUM 16-FT WIDE ROLL SHALL BE USED FOR 2-LAYER STACKED BULK BAG COFFERDAM.
9. BULK BAG COFFERDAM SHALL BE COMPLETELY REMOVED AFTER CONSTRUCTION IS COMPLETED AND TURBIDITY HAS BEEN REMOVED.
10. ALTERNATE COFFERDAM MATERIALS AND CONFIGURATIONS MAY BE ALLOWED BUT SHALL NOT BE IMPLEMENTED WITHOUT REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND/OR VENDOR CUT SHEETS FOR SUBSTITUTIONS.



PLAN VIEW



WATTLE DETAIL



8" DIAMETER WATTLE SPACING TABLE	
SLOPE	MAXIMUM SPACING
1H : 1V	10' - 0"
2H : 1V	20' - 0"
3H : 1V	30' - 0"
4H : 1V	40' - 0"

II - TYPICAL DETAIL - STRAW WATTLE

NOT TO SCALE

NOTES

1. WATTLES SHALL BE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATION 9-14.5(5). INSTALL WATTLES ALONG CONTOURS. INSTALLATION SHALL BE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATION 8-01.3(10).
2. SECURELY KNOT EACH END OF WATTLE. OVERLAP ADJACENT WATTLE ENDS 12" BEHIND ONE ANOTHER AND SECURELY TIE TOGETHER.
3. COMPACT EXCAVATED SOIL AND TRENCHES TO PREVENT UNDERCUTTING. ADDITIONAL STAKING MAY BE NECESSARY TO PREVENT UNDERCUTTING.
4. INSTALL WATTLE PERPENDICULAR TO FLOW ALONG CONTOURS.
5. WATTLES SHALL BE INSPECTED REGULARLY, AND IMMEDIATELY AFTER A RAINFALL PRODUCES RUNOFF, TO ENSURE THEY REMAIN THOROUGHLY ENTRENCHED AND IN CONTACT WITH THE SOIL.
6. PERFORM MAINTENANCE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATION 8-01.3(15).
7. REFER TO WSDOT STANDARD SPECIFICATION 8-01.3(16) FOR REMOVAL.

NO.	BY	DATE	REVISION DESCRIPTION

SP, NS (DRAWN) | JG, EA (DESIGNED) | JG, EA (CHECKED)
- (APPROVED) | NOV 30, 2022 (DATE) | (PROJECT)

CONFEDERATED TRIBES OF THE UMATILLA
TÚUŠI WÁNA FLOODPLAIN ENHANCEMENT
PRELIMINARY DESIGN

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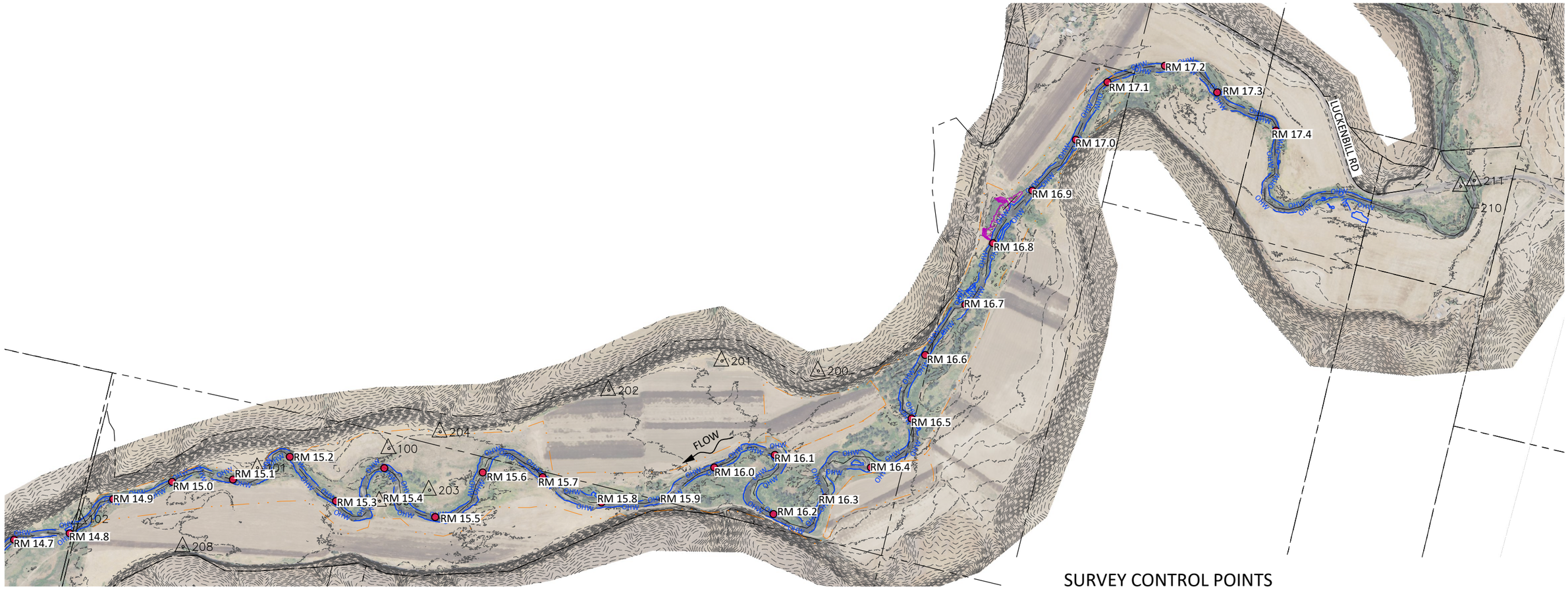
EROSION CONTROL DETAILS

SHEET 6 OF 21



PLAN VIEW

0 1000 2000

SCALE IN FEET

LEGEND

- EXISTING CONTOURS (5 FT)
- TAXLOTS
- OHW — ORDINARY HIGH WATER
- TÚUŠI WÁNA (TOUCHET RIVER) ALIGNMENT
- RM XX — RIVER MILE
- PLANNING LEVEL CONSERVATION EASEMENT
- SURVEY CONTROL POINT

SURVEY CONTROL POINTS

POINT NUMBER	EASTING	NORTHING	ELEVATION	DESCRIPTION
100	2117364.82	324966.38	693.59	REBAR
101	2116145.36	324441.79	693.00	REBAR
102	2114554.28	323487.02	682.77	REBAR
200	2121321.87	326832.10	853.82	REBAR
201	2120362.15	326677.57	708.85	REBAR
202	2119342.81	326101.04	703.31	REBAR
203	2117865.02	324670.97	693.23	REBAR
204	2117819.70	325260.39	699.81	REBAR
205	2112177.75	321225.05	692.16	NAIL
206	2111946.71	320896.85	684.69	CP DKSK I4BRB
207	2112326.99	320778.29	695.31	NAIL
208	2115627.15	323485.66	684.12	REBAR
209	2117412.02	324436.06	691.74	NAIL
210	2127060.80	330281.80	742.09	CP 210 DKSK
211	2127178.36	330372.09	744.66	NAIL

NO.	BY	DATE	REVISION DESCRIPTION

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\- — APPROVED | NOV 30, 2022 — DATE | — PROJECT

CONFEDERATED TRIBES OF THE UMATILLA TÚUŠI WÁNA FLOODPLAIN ENHANCEMENT PRELIMINARY DESIGN

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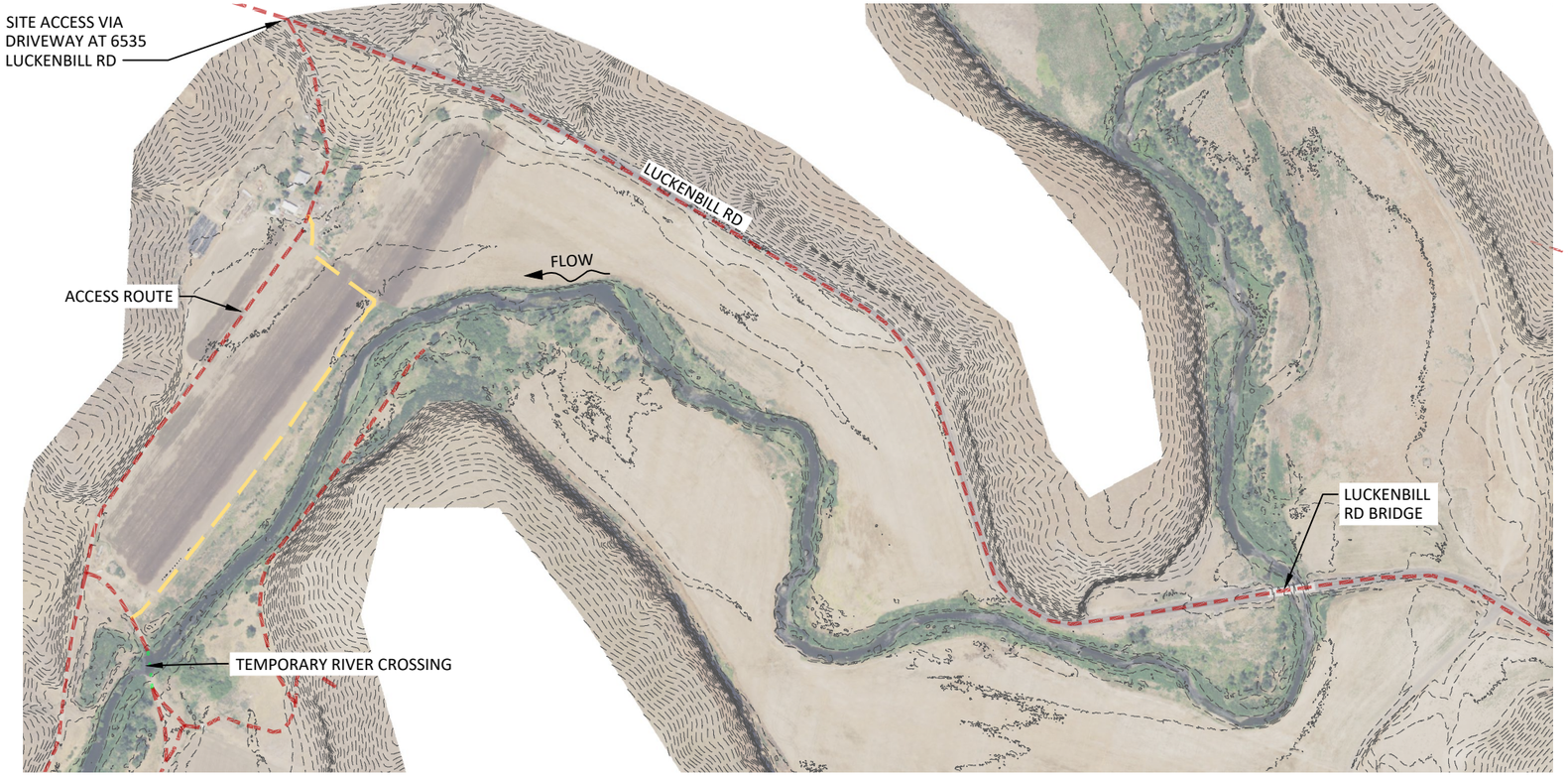
EXISTING CONDITIONS AND SURVEY CONTROL

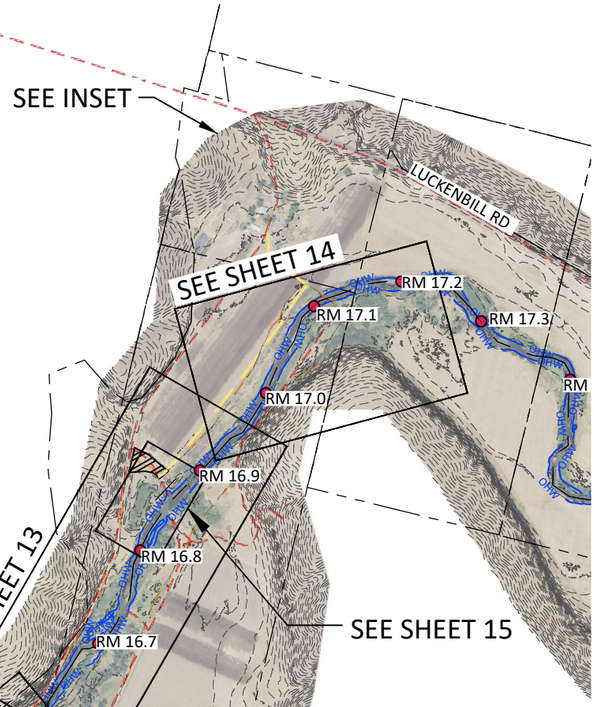
SHEET 7 OF 21



PLAN VIEW - ACCESS

0 600 1200

SCALE IN FEET



0 1000 2000

SCALE IN FEET

PLAN VIEW

LEGEND

- EXISTING CONTOURS (5 FT)
- TAXLOTS
- LIMIT OF DISTURBANCE
- OHW — ORDINARY HIGH WATER
- TÚUŠI WÁNA (TOUCHET RIVER) ALIGNMENT
- RM XX — RIVER MILE
- PLANNING LEVEL CONSERVATION EASEMENT
- PROPOSED STAGING AREA
- EXISTING ACCESS
- TEMPORARY ACCESS

NO.	BY	DATE	REVISION DESCRIPTION

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-	NOV 30, 2022	
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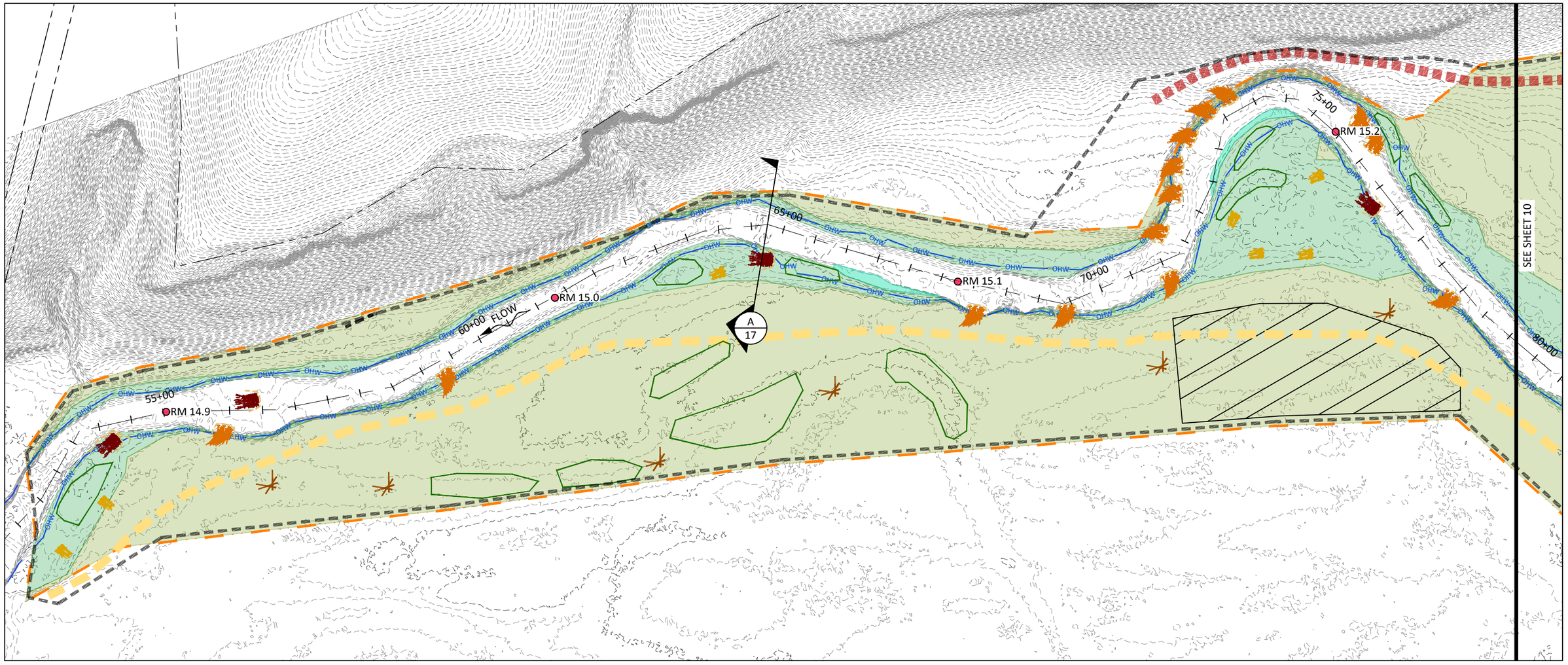
SHEET INDEX, ACCESS & STAGING

SHEET 8 OF 21



PLAN VIEW

0 150 300

SCALE IN FEET

LEGEND

- EXISTING CONTOURS (1 FT)
- EXISTING CONTOURS (5 FT)
- TAXLOTS
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)
- 30+00 TÚUŠI WÁNA (TOUCHET RIVER) ALIGNMENT AND STATIONING
- RM XX RIVER MILE
- PLANNING LEVEL CONSERVATION EASEMENT
- PROPOSED STAGING AREA
- EXISTING ACCESS
- TEMPORARY ACCESS
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- TRANSITIONAL REVEGETATION ZONE
- UPLAND REVEGETATION ZONE
- LIVE STAKES ZONE, SEE DETAIL 3, SHEET 20
- COFFERDAM, SEE DETAIL 1, SHEET 6

NOTES:

1. SEE SHEET 21 FOR PLANTING TABLES.
2. RIGHT AND LEFT BANK TO BE PLANTED ACCORDING TO LIVE CUTTING PLANTING ZONE, SEE SHEET 21.
3. TEMPORARY ACCESS ROADS TO BE SEEDED AFTER DECOMMISSIONING, SEE SHEET 21.

NO.	BY	DATE	REVISION DESCRIPTION

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JG, EA — DESIGNED
JG, EA — CHECKED
- — APPROVED
NOV 30, 2022 — DATE
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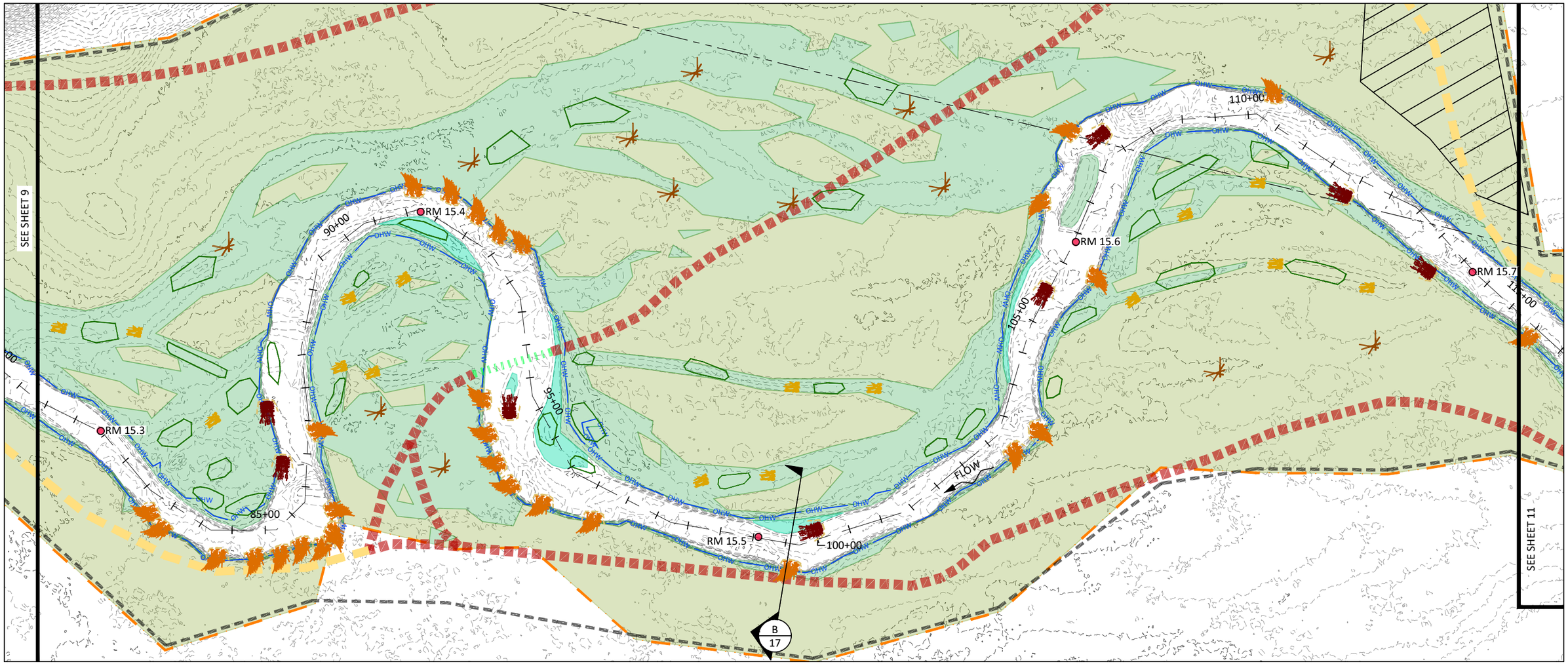
PROPOSED CONDITIONS (1 OF 6)

SHEET
9 OF 21



PLAN VIEW

0 150 300

SCALE IN FEET

LEGEND

- EXISTING CONTOURS (1 FT)
- EXISTING CONTOURS (5 FT)
- TAXLOTS
- LIMITS OF DISTURBANCE
- OHW — ORDINARY HIGH WATER
- 30+00 — TÚUŠI WÁNA (TOUCHET RIVER) ALIGNMENT AND STATIONING
- RM XX — RIVER MILE
- PLANNING LEVEL CONSERVATION EASEMENT
- PROPOSED STAGING AREA
- TEMPORARY RIVER CROSSING
- EXISTING ACCESS
- TEMPORARY ACCESS
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CONFEDERATED TRIBES OF THE UMATILLA TÚUŠI WÁNA FLOODPLAIN ENHANCEMENT PRELIMINARY DESIGN

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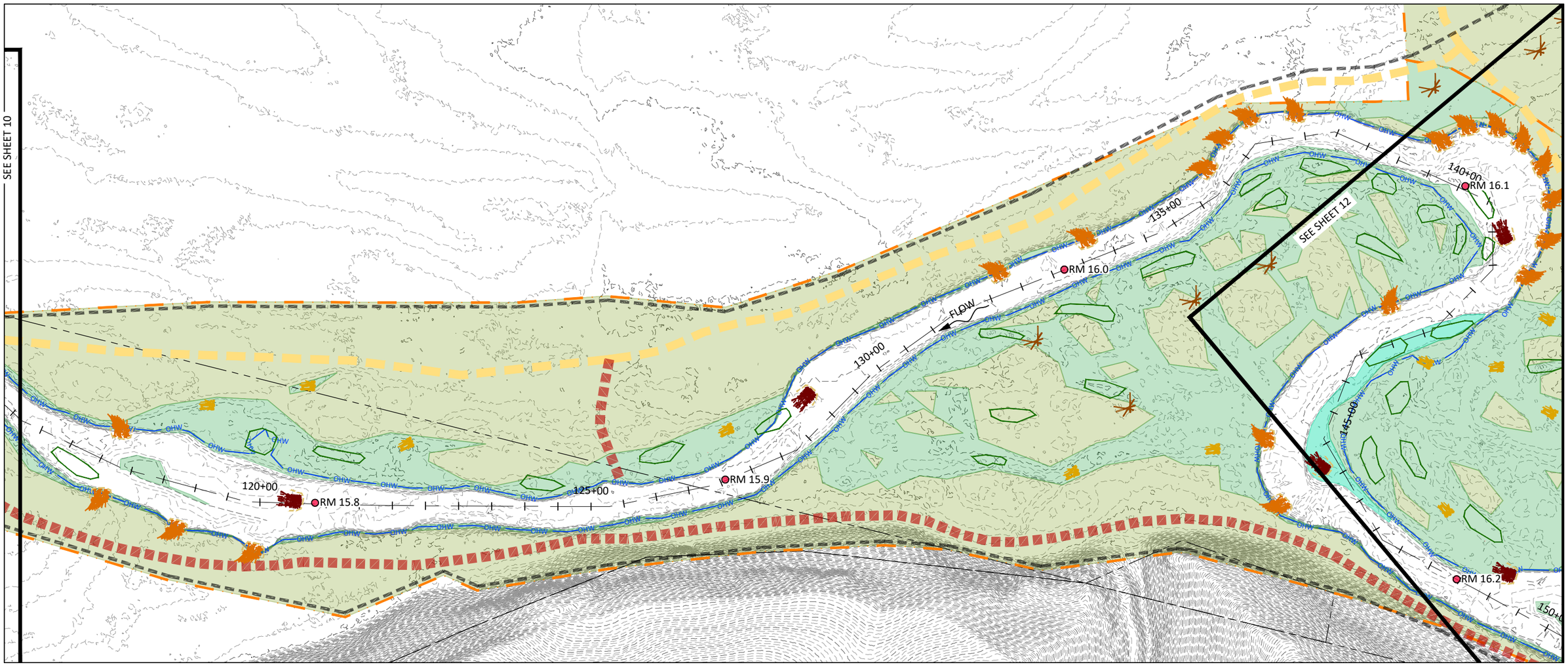
PROPOSED CONDITIONS (2 OF 6)

SHEET 10 OF 21



PLAN VIEW

0 150 300

SCALE IN FEET

LEGEND

- EXISTING CONTOURS (1 FT)
- EXISTING CONTOURS (5 FT)
- TAXLOTS
- LIMITS OF DISTURBANCE
- OHW — ORDINARY HIGH WATER
- 30+00 — TÚUŠI WÁNA (TOUCHET RIVER) ALIGNMENT AND STATIONING
- RM XX — RIVER MILE
- PLANNING LEVEL CONSERVATION EASEMENT
- EXISTING ACCESS
- TEMPORARY ACCESS
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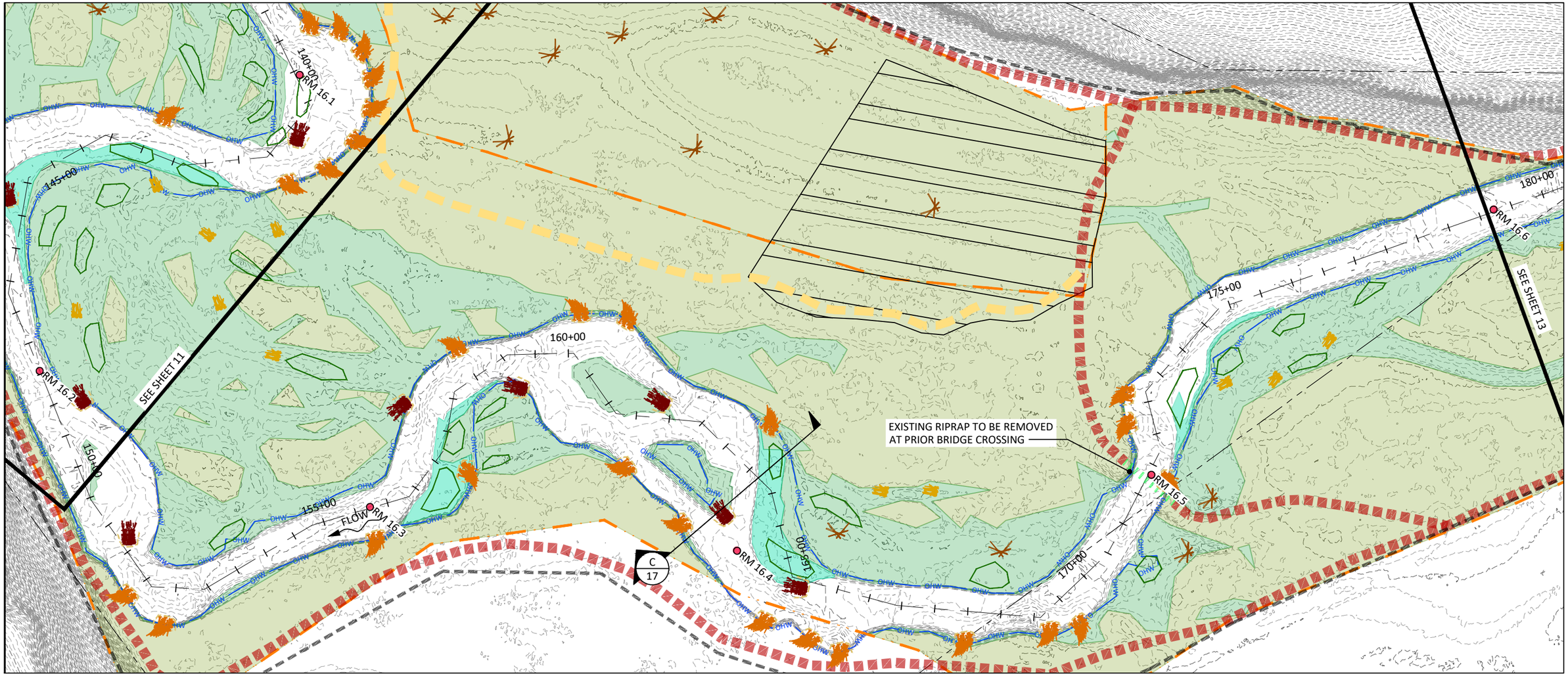
PROPOSED CONDITIONS (3 OF 6)

SHEET 11 OF 21



LEGEND

- EXISTING CONTOURS (1 FT)
- EXISTING CONTOURS (5 FT)
- TAXLOTS
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER
- 30+00 — TÚUŠI WÁNA (TOUCHET RIVER) ALIGNMENT AND STATIONING
- RM XX — RIVER MILE
- PLANNING LEVEL CONSERVATION EASEMENT
- PROPOSED STAGING AREA

PLAN VIEW

- TEMPORARY RIVER CROSSING
- EXISTING ACCESS
- TEMPORARY ACCESS
- APEX LARGE WOOD STRUCTURE, SEE DETAIL 1, SHEET 18
- BANK-BURIED LARGE WOOD STRUCTURE, SEE DETAIL 2, SHEET 18
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- UPLAND REVEGETATION ZONE
- LIVE STAKES ZONE, SEE DETAIL 3, SHEET 20
- COFFERDAM, SEE DETAIL 1, SHEET 6

0 150 300

SCALE IN FEET

NOTES:

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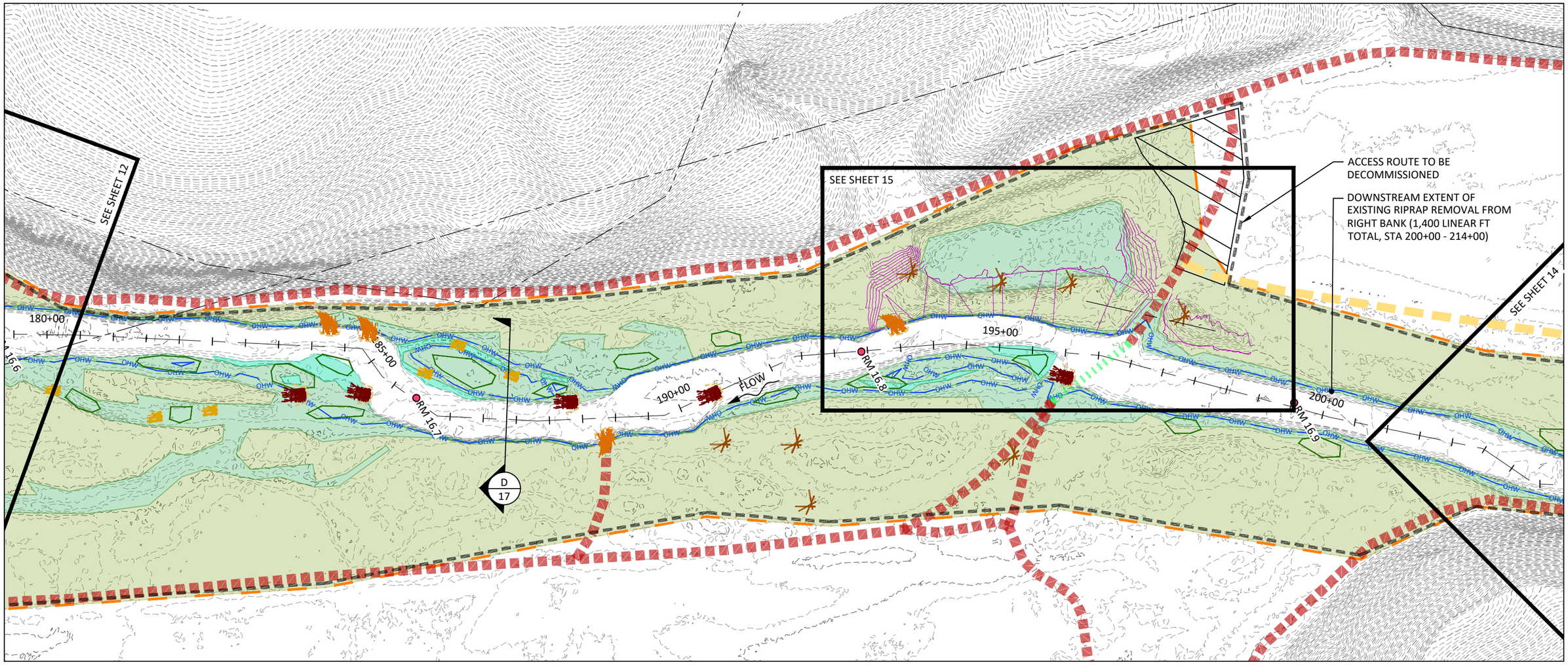
PROPOSED CONDITIONS (4 OF 6)

SHEET 12 OF 21



LEGEND

- EXISTING CONTOURS (1 FT)
- EXISTING CONTOURS (5 FT)
- TAXLOTS
- LIMITS OF DISTURBANCE
- ORDINARY HIGH WATER (OHW)
- 30+00 — TÚUŠI WÁNA (TOUCHET RIVER) ALIGNMENT AND STATIONING
- RM XX — RIVER MILE
- PLANNING LEVEL CONSERVATION EASEMENT
- PROPOSED STAGING AREA

0 150 300

SCALE IN FEET

PLAN VIEW

- TEMPORARY RIVER CROSSING
- EXISTING ACCESS
- TEMPORARY ACCESS
- APEX LARGE WOOD STRUCTURE, SEE DETAIL 1, SHEET 18
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- PROPOSED CONTOURS (1 FT)
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- TRANSITIONAL REVEGETATION ZONE
- UPLAND REVEGETATION ZONE
- LIVE STAKES ZONE, SEE DETAIL 3, SHEET 20
- COFFERDAM, SEE DETAIL 1, SHEET 6

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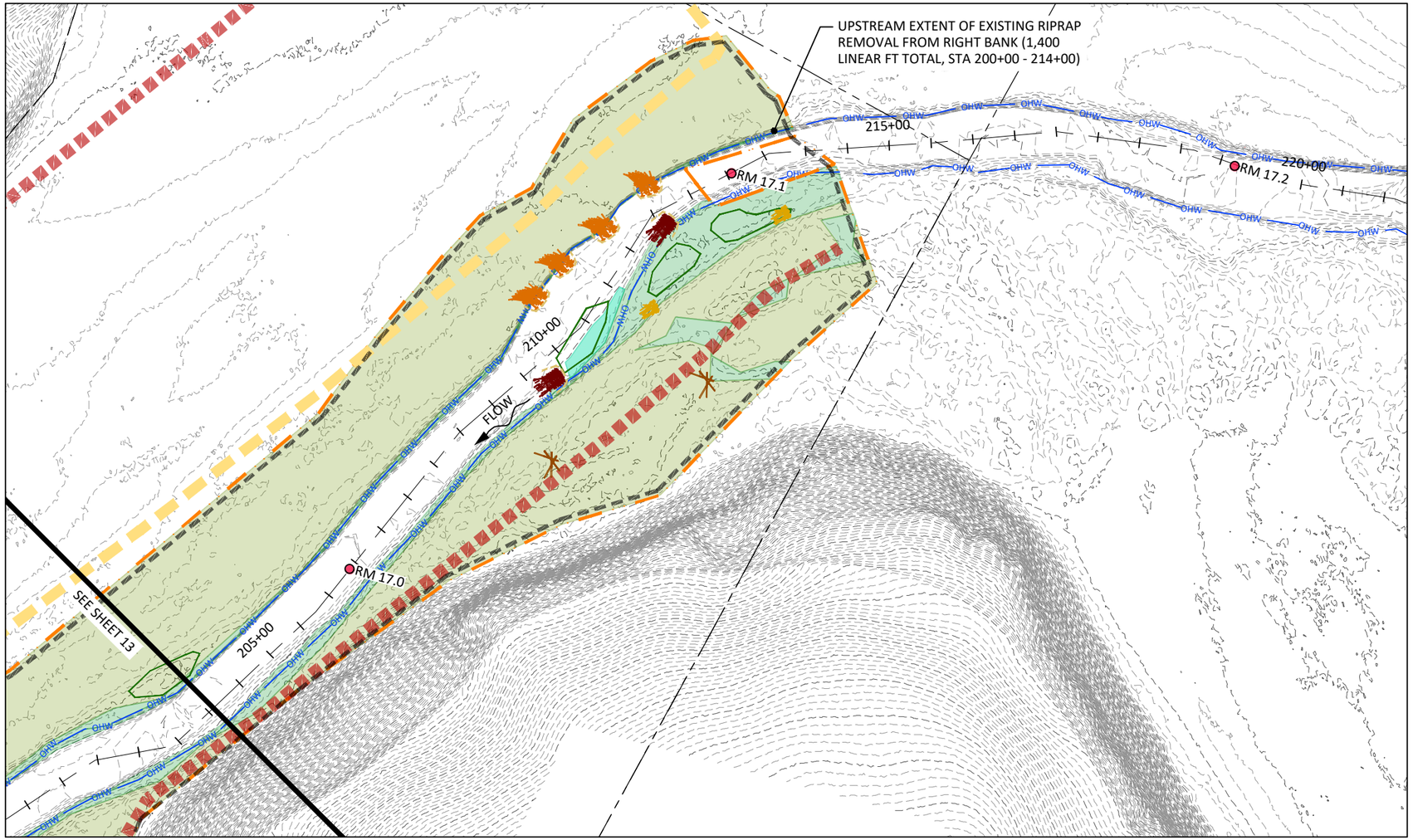
PROPOSED CONDITIONS (5 OF 6)

SHEET 13 OF 21



PLAN VIEW

0 150 300

SCALE IN FEET

LEGEND

- EXISTING CONTOURS (1 FT)
- EXISTING CONTOURS (5 FT)
- TAXLOTS
- LIMITS OF DISTURBANCE
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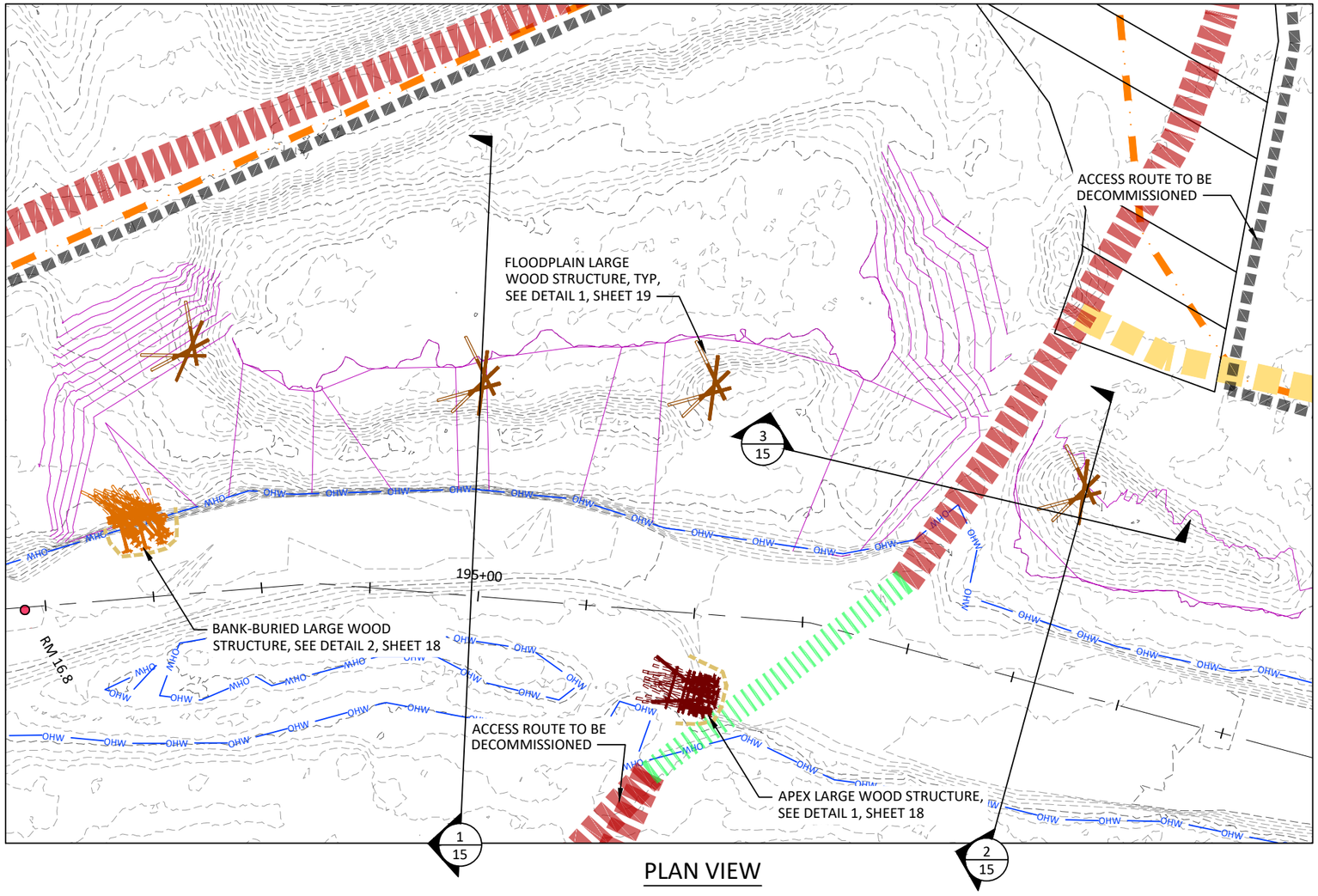
PROPOSED CONDITIONS (6 OF 6)

SHEET 14 OF 21



PLAN VIEW

LEGEND

- EXISTING CONTOURS (1 FT)
- EXISTING CONTOURS (5 FT)
- PROPOSED CONTOURS (1 FT)
- TAXLOTS
- LIMITS OF DISTURBANCE
- OHW — ORDINARY HIGH WATER
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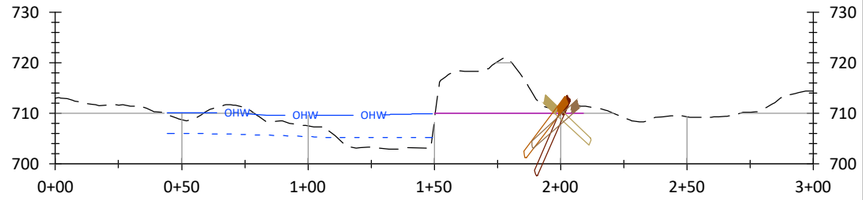
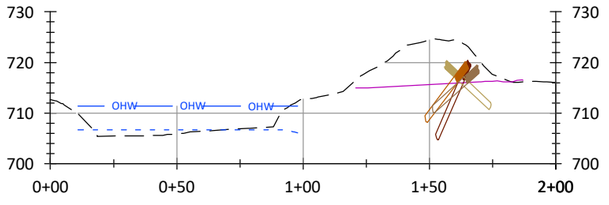
- TEMPORARY RIVER CROSSING
- EXISTING ACCESS
- TEMPORARY ACCESS
- COFFERDAM, SEE DETAIL 1, SHEET 6



SECTION 1



SECTION 2

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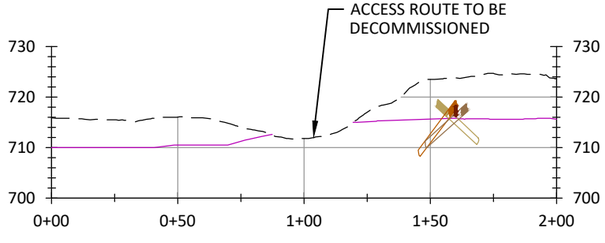
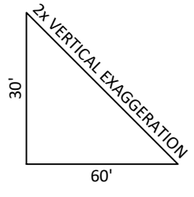
SCALE IN FEET



SECTION 3

LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- OHW — OHW — ORDINARY HIGH WATER (2 YR)
- LOW FLOW (9 CFS)



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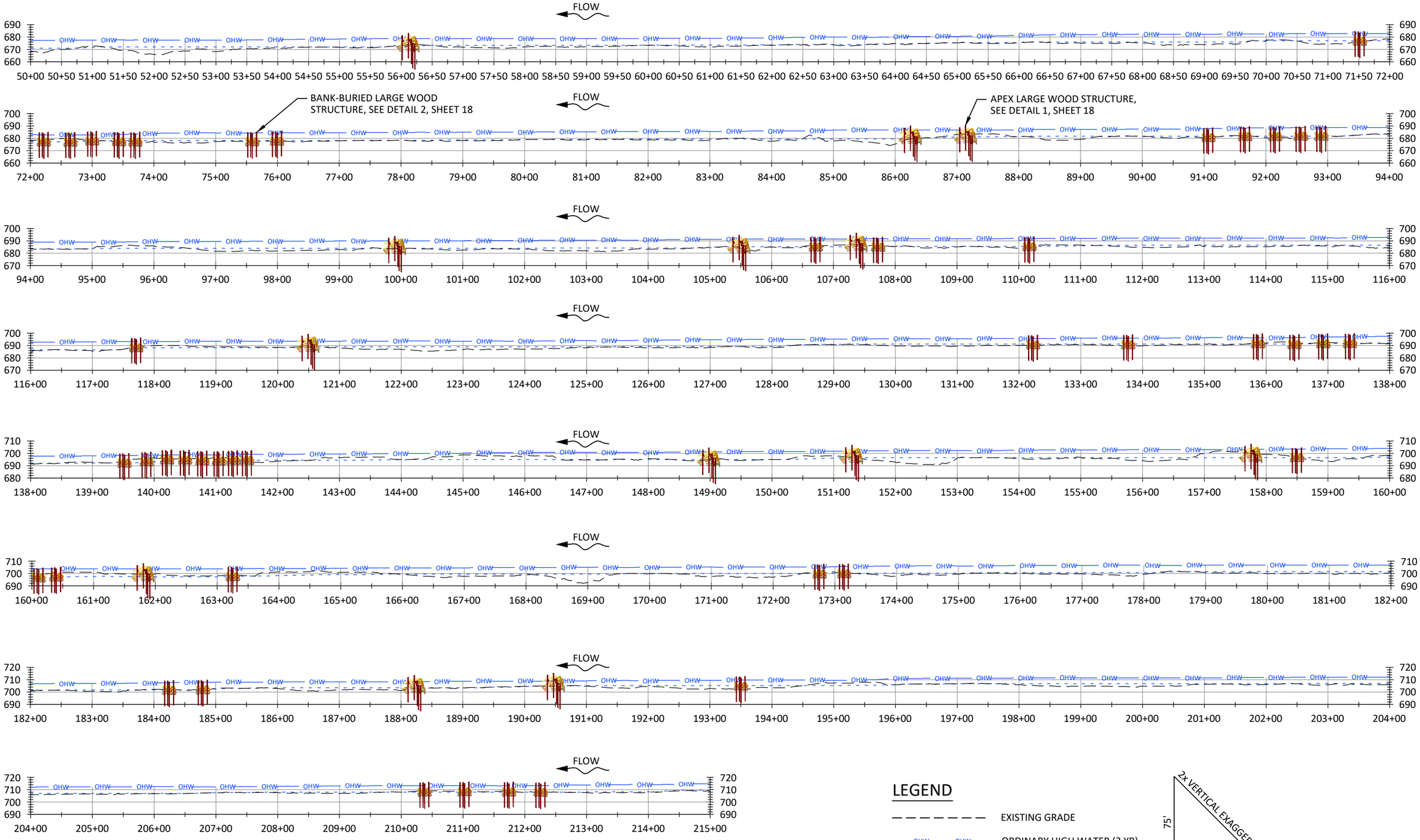
HOLDING POND

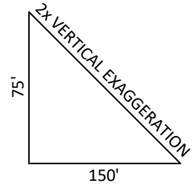
SHEET
15 OF 21



TÚUŠI WÁNA LONGITUDINAL PROFILE

LEGEND

- EXISTING GRADE
- ORDINARY HIGH WATER (2 YR)
- LOW FLOW (9 CFS)



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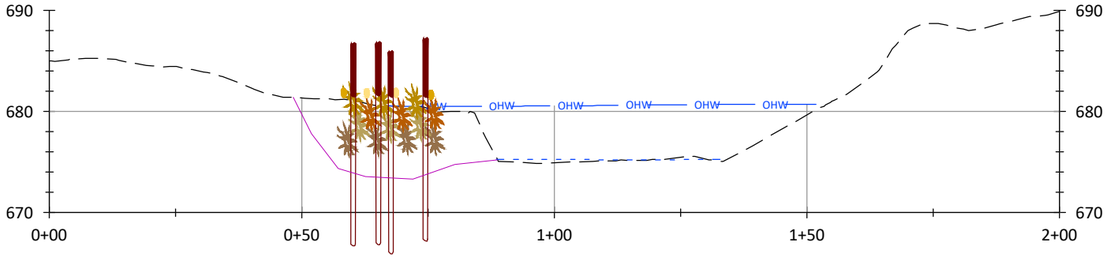
PROFILE

SHEET
16 OF 21



A
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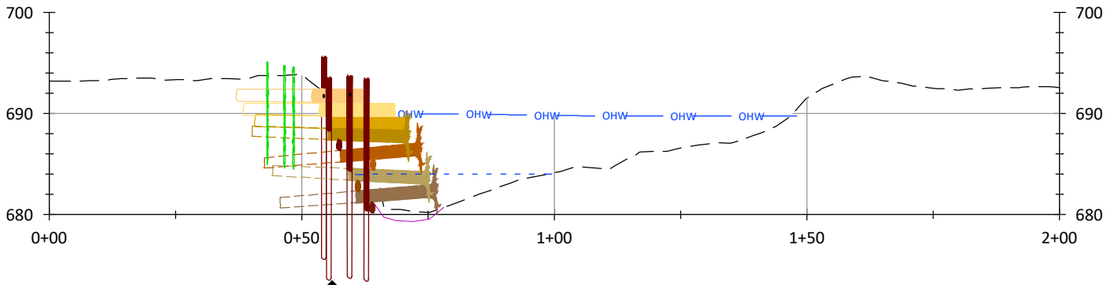
TYPICAL SECTION



B
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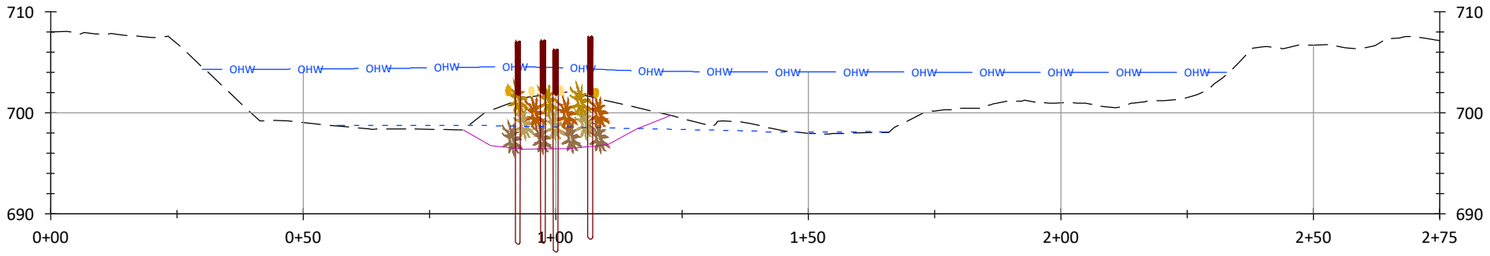
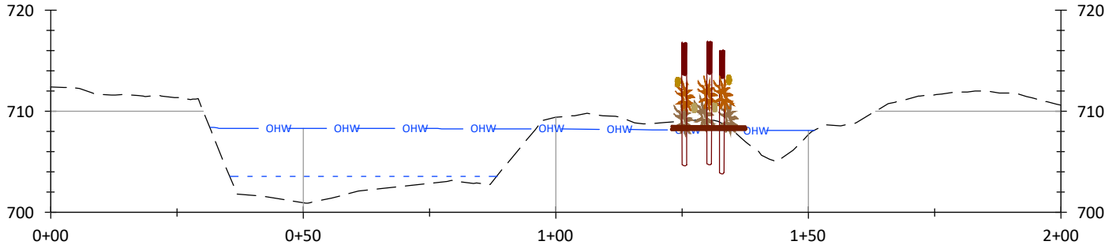
TYPICAL SECTION



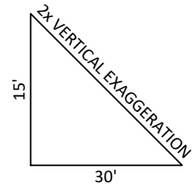
C
17
TYPICAL SECTION



D
17
TYPICAL SECTION

LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- OHW OHW ORDINARY HIGH WATER (2 YR)
- LOW FLOW (9 CFS)



NO.	BY	DATE	REVISION DESCRIPTION

SP, NS	JG, EA	JG, EA
DRAWN	DESIGNED	CHECKED
-	NOV 30, 2022	
APPROVED	DATE	PROJECT

CONFEDERATED TRIBES OF THE UMATILLA
TÚUŠI WÁNA FLOODPLAIN ENHANCEMENT
PRELIMINARY DESIGN

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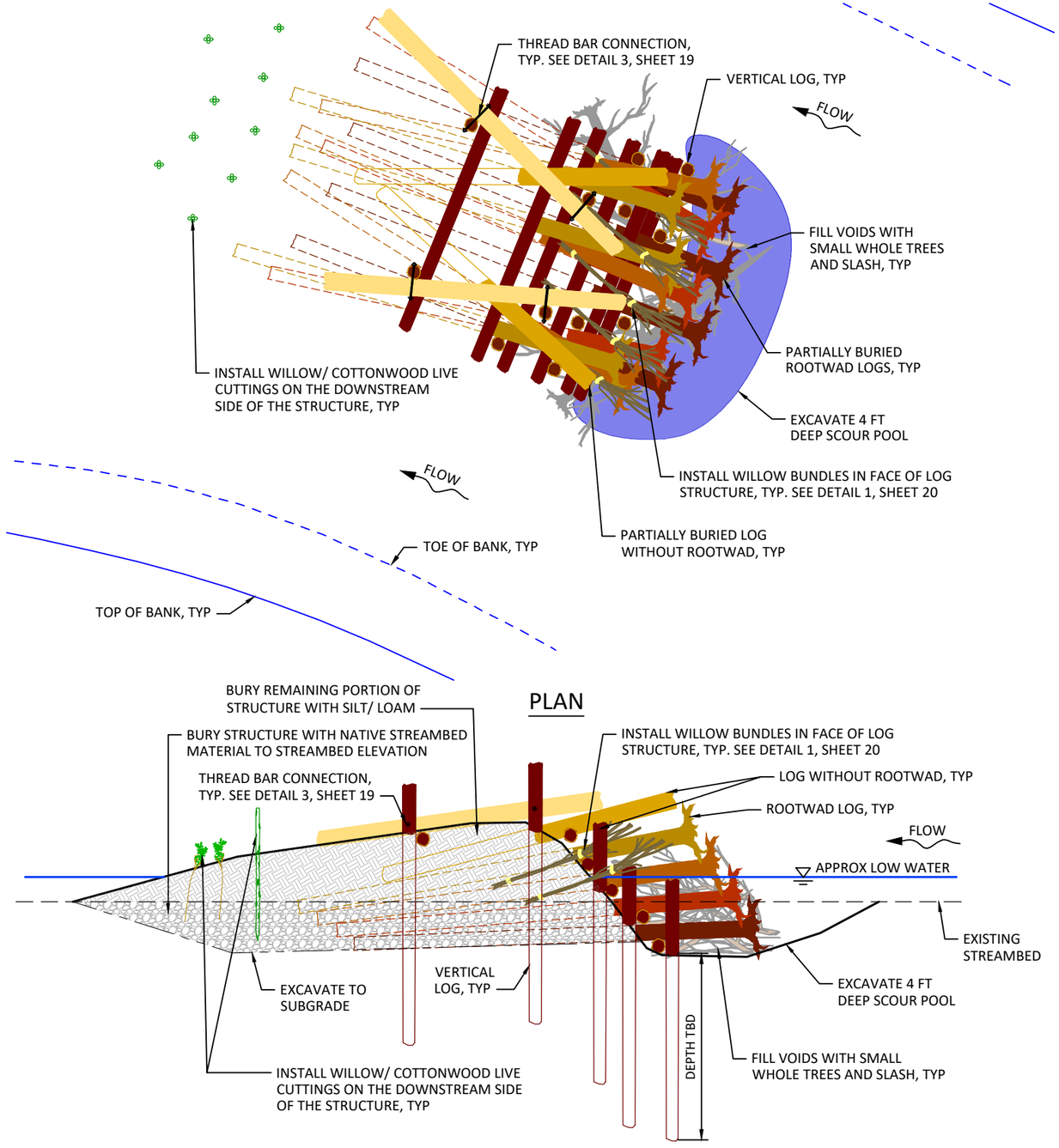
TYPICAL SECTIONS

SHEET
17 OF 21

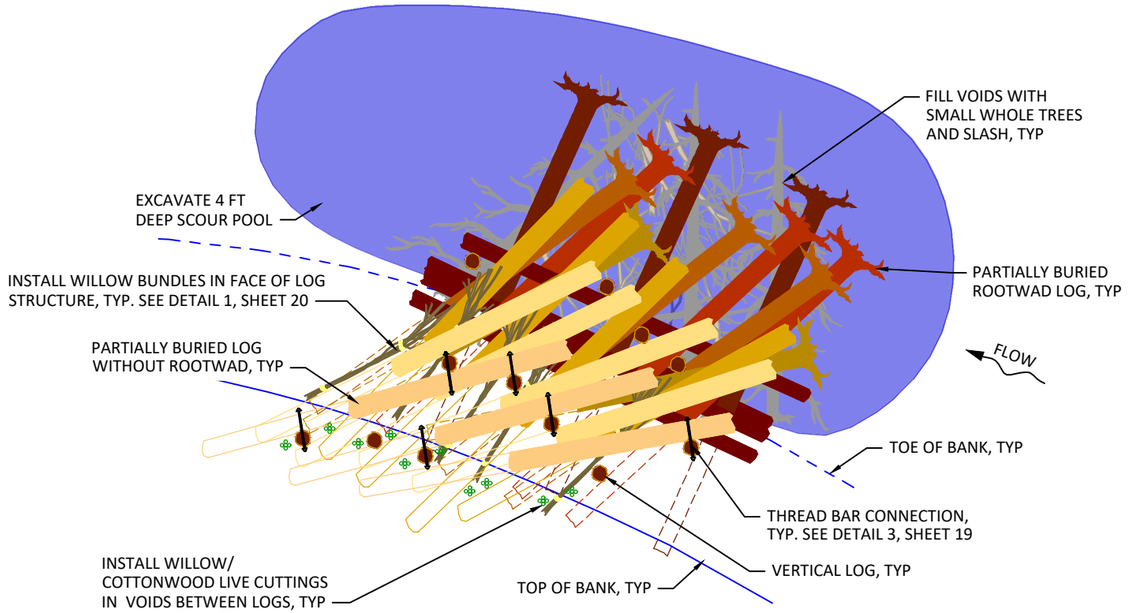


PLAN

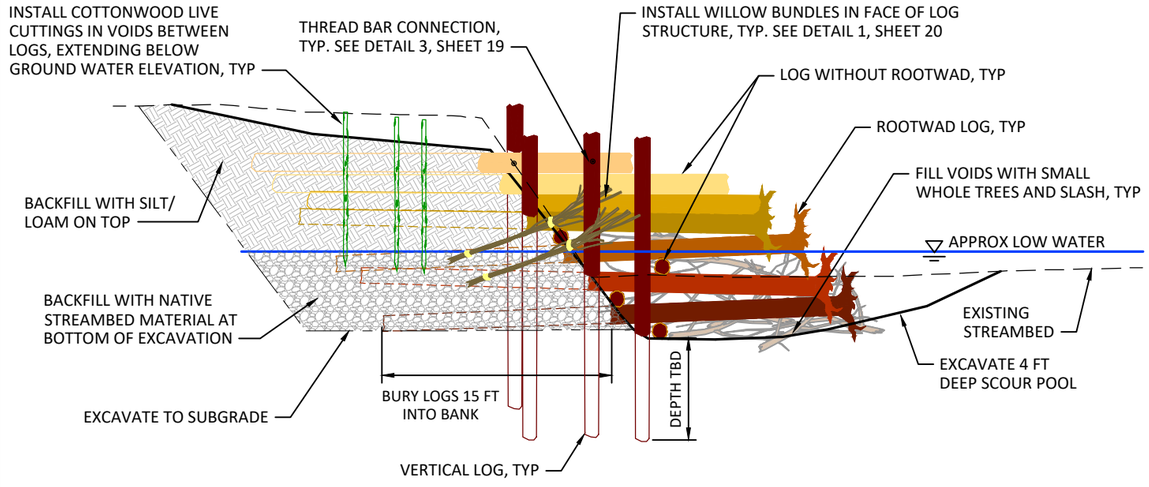
SECTION

1 / 18 TYPICAL DETAIL - APEX LARGE WOOD STRUCTURE

1" = 10'



PLAN



SECTION

2 / 18 TYPICAL DETAIL - BANK-BURIED LARGE WOOD STRUCTURE

1" = 10'

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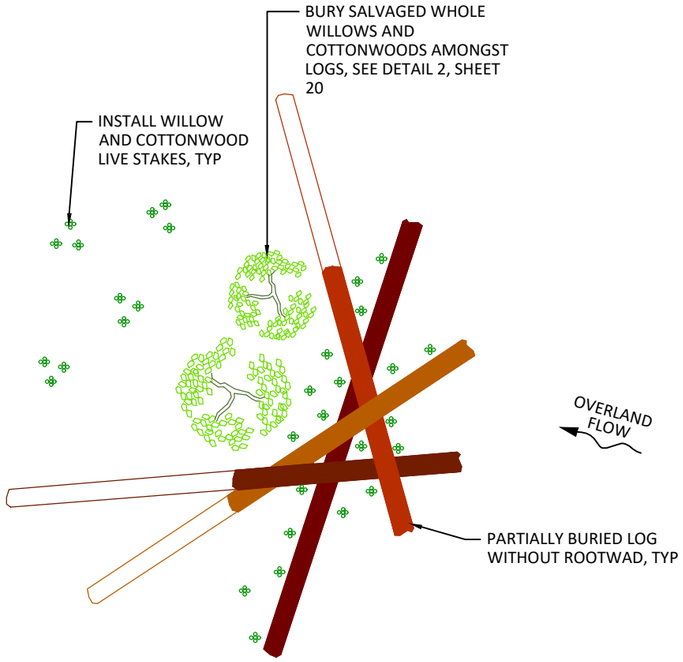
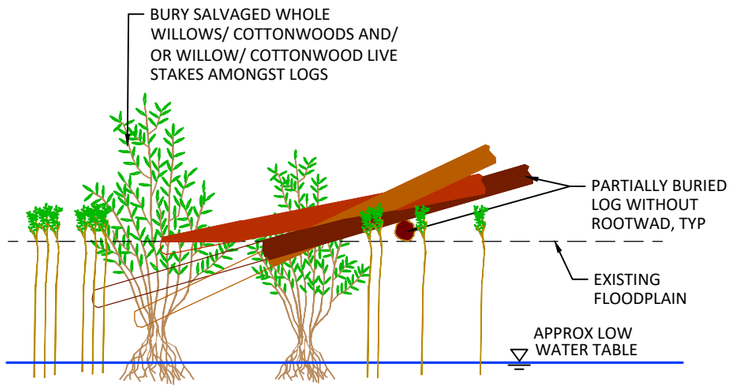
TYPICAL DETAILS - LARGE WOOD STRUCTURES

SHEET 18 OF 21



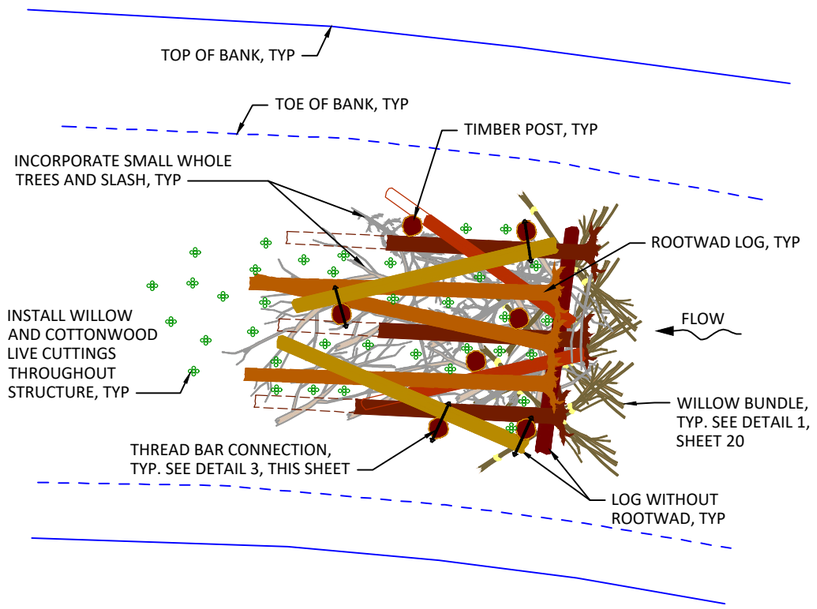
PLAN



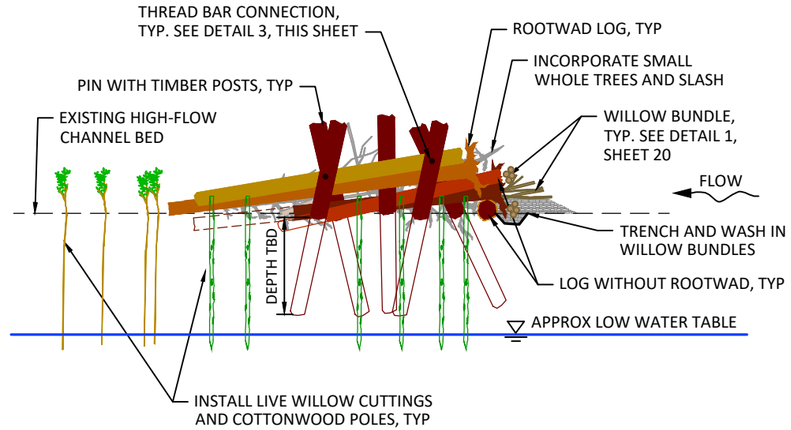
SECTION

1/19 TYPICAL DETAIL - FLOODPLAIN LARGE WOOD STRUCTURE

1" = 10'



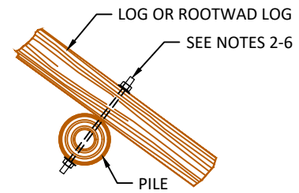
PLAN



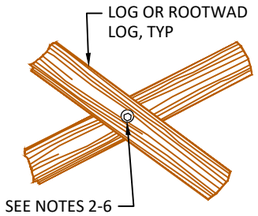
SECTION

2/19 TYPICAL DETAIL - OFF-CHANNEL POST-ASSISTED LOG STRUCTURE

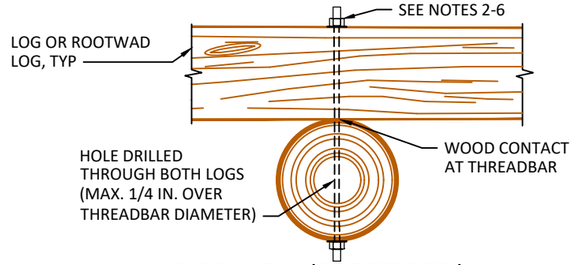
1" = 10'



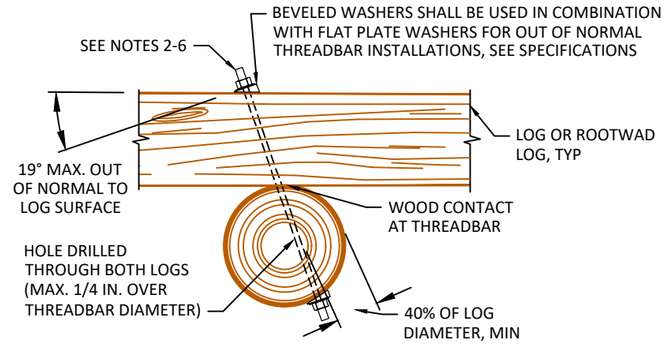
PLAN (LOG-PILE)



PLAN (LOG-LOG)



SIDE VIEW (PREFERRED)



SIDE VIEW (ALTERNATE)

NOTES:

1. REQUIREMENTS FOR LOG TO LOG AND LOG TO PILE CONNECTIONS AT LOCATIONS SHOWN ON THE LARGE WOOD TYPICAL DETAIL OR AS OTHERWISE REQUIRED BY THE ENGINEER. THREADBAR SHALL BE #8 FULLY THREADED REBAR WITH A MIN. TENSILE YIELD RATING OF 75,000 POUNDS PER SQUARE INCH (75KSI). WASHERS SHALL BE 3" SQUARE AND 3/16" THICK. NUTS SHALL MATCH THREADBAR AND BE CAPABLE OF DEVELOPING 100% OF THE THREADBAR CAPACITY IN TENSION.
2. INSERT THREADBAR THROUGH HOLE DRILLED IN BOTH LOGS.
3. PLACE WASHER(S) OVER EACH END OF THREADBAR. THREAD A NUT ONTO EACH END OF THREADBAR AND TIGHTEN UNTIL WOOD SURFACE CRUSHES UNDER THE WASHER.
4. IF END OF THREADBAR EXTENDS MORE THAN 2 IN. BEYOND NUT. CUT OFF EXCESS TO NO CLOSER THAN 1 IN. FROM THE NUT.
5. PEEN END OF THREADBAR OR CHISEL THREADS SO NUT CANNOT BE BACKED OFF.
6. FILE OR GRIND OFF SHARP EDGES.

3/19 TYPICAL DETAIL - THREAD BAR CONNECTION

NOT TO SCALE

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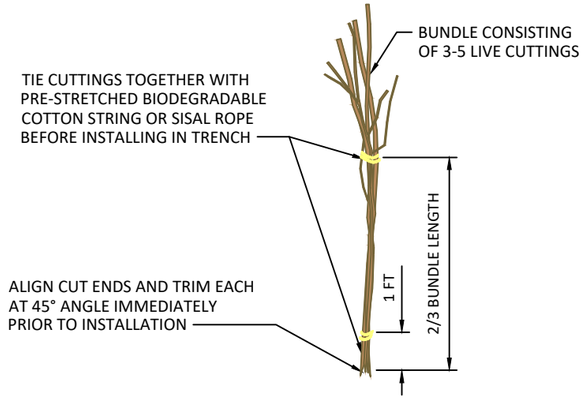
TYPICAL DETAILS - LARGE WOOD STRUCTURES

SHEET 19 OF 21



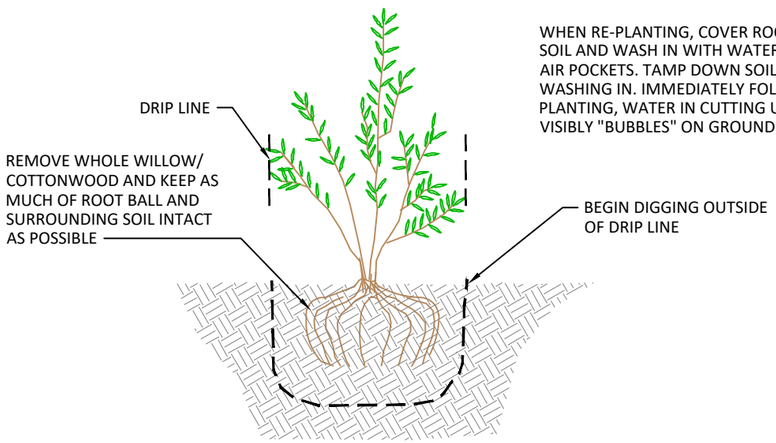
1/20 TYPICAL DETAIL - LIVE CUTTING BUNDLE

NOT TO SCALE

NOTES:

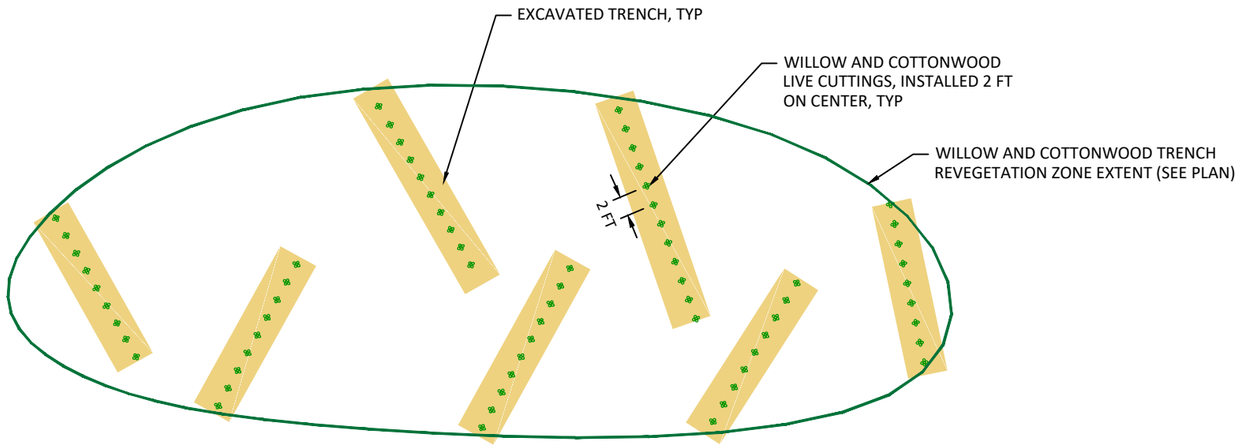
SALVAGE AND RE-PLANT ALL WILLOWS AND COTTONWOODS IMPACTED BY EXCAVATION.

WHEN RE-PLANTING, COVER ROOT BALL WITH SOIL AND WASH IN WITH WATER TO REMOVE AIR POCKETS. TAMP DOWN SOIL FOLLOWING WASHING IN. IMMEDIATELY FOLLOWING PLANTING, WATER IN CUTTING UNTIL WATER VISIBLY "BUBBLES" ON GROUND SURFACE.



2/20 TYPICAL DETAIL - WILLOW/ COTTONWOOD SALVAGE

NOT TO SCALE

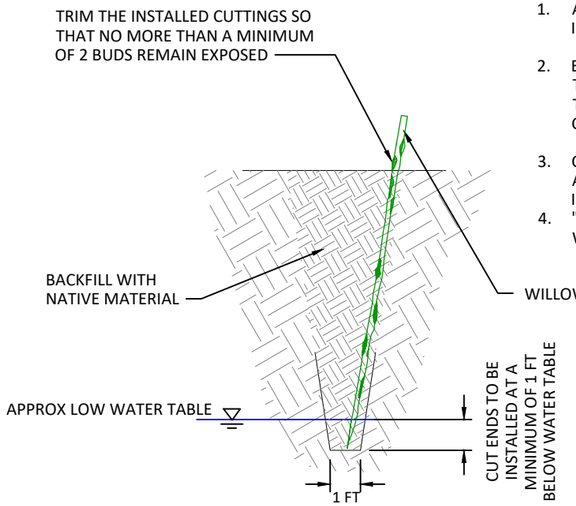


PLAN

1" = 30'

NOTES:

1. ALL LIVE CUTTINGS TO BE CUT TO A POINT IMMEDIATELY PRIOR TO INSTALLATION.
2. EXCAVATE TRENCH TO 1 FT BELOW WATER TABLE DEPTH. PUMP WATER INTO TRENCH. INSTALL LIVE CUTTINGS WITH CUT ENDS IN TOE OF TRENCH.
3. CONTINUE TO PUMP WATER INTO TRENCH AND COMPACT SOIL BACKFILL IN LIFTS TO IMPROVE STEM TO SOIL CONTACT.
4. "WATER IN" FINISHED CUTTING UNTIL WATER VISIBLY "BUBBLES" ON SURFACE.



SECTION

1" = 5'

3/20 TYPICAL DETAIL - WILLOW AND COTTONWOOD TRENCH

LIVE CUTTINGS FOR WOOD STRUCTURES					
COMMON NAME	**SCIENTIFIC NAME**	**STOCK**	**TYPE**	**SIZE**	**QUANTITY (EA)**
Black cottonwood	*Populus trichocarpa*	Tree	Live pole	8-10 ft, 2-3.5" diameter	2720
Booth willow	*Salix boothii*	Shrub	Live pole	8-10 ft, 2-3.5" diameter	2720
Coyote willow	*Salix exigua*	Shrub	Live pole	8-10 ft, 2-3.5" diameter	2720

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\- — APPROVED | NOV 30, 2022 — DATE | 220220 — PROJECT

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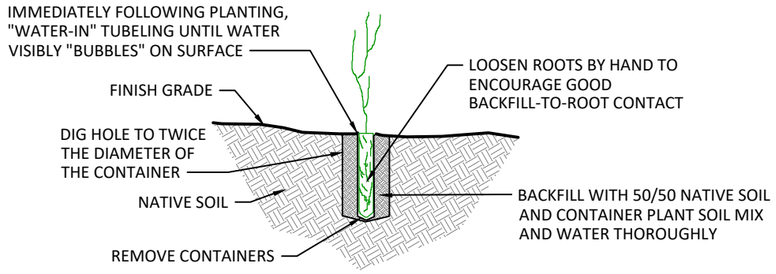
TYPICAL DETAILS - LIVE
WILLOW & COTTONWOOD
CUTTINGS AND SALVAGE

SHEET
20 OF 21

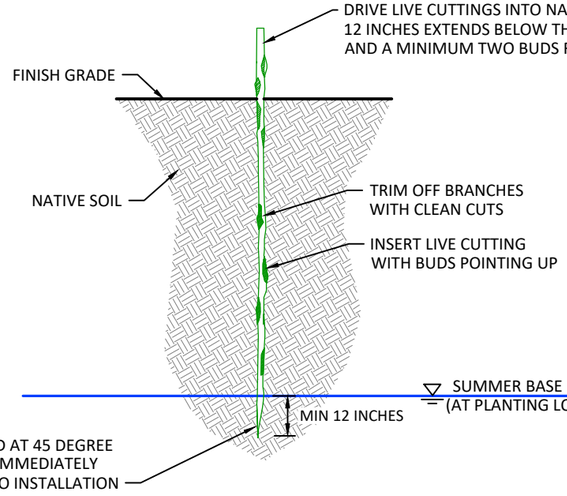
SEED MIX

SEEDING ZONE (14.5 ACRES)		
Seeding rate: 30 lbs/acre (435 lbs)		
COMMON NAME	**SCIENTIFIC NAME**	**PERCENT OF WHOLE MIX**
Bluebunch wheatgrass	*Pseudoroegneria spicata*	42%
Idaho fescue	*Festuca idahoensis*	22%
Bottlebrush squirreltail	*Elymus elymoides*	16%
Sandberg's bluegrass	*Poa secunda*	12%
Prairie junegrass	*Koeleria macrantha*	8%



1/21 TYPICAL DETAIL - TUBELING

NOT TO SCALE



NOTES:

1. DEVELOP PILOT HOLE TO 1 FT BELOW WATER TABLE DEPTH. PUMP WATER INTO HOLE. INSTALL LIVE CUTTINGS WITH CUT ENDS DOWN.
2. CONTINUE TO PUMP WATER INTO HOLE AND COMPACT SOIL BACKFILL IN LIFTS TO IMPROVE STEM TO SOIL CONTACT.
3. WATER IN FINISHED CUTTING UNTIL WATER VISIBLY "BUBBLES" ON SURFACE.

2/21 TYPICAL DETAIL - LIVE CUTTING

NOT TO SCALE

PLANTING TABLES

LIVE CUTTING PLANTING ZONES (73,200 LF)						
COMMON NAME	**SCIENTIFIC NAME**	**STOCK**	**TYPE**	**SIZE**	**DENSITY**	**QUANTITY (EA)**
Black cottonwood	*Populus trichocarpa*	Tree	Live cutting	8-10 ft, 2-3.5" diameter	2 ft on center	12200
Booth willow	*Salix boothii*	Shrub	Live cutting	8-10 ft, 2-3.5" diameter	2 ft on center	12200
Coyote willow	*Salix exigua*	Shrub	Live cutting	8-10 ft, 2-3.5" diameter	2 ft on center	12200

RIPARIAN PLANTING ZONES (1.4 ACRES)						
COMMON NAME	**SCIENTIFIC NAME**	**STOCK**	**TYPE**	**SIZE**	**DENSITY**	**QUANTITY (EA)**
Black cottonwood	*Populus trichocarpa*	Tree	Live cutting	10-12 ft, 2-3.5" diameter	Clusters of 4; 5 ft on center	3160
Pacific willow	*Salix lasiandra*	Tree	Tubeling	10 in^3	5 ft on center	790
Thinleaf alder	*Alnus incana*	Tree	Tubeling	10 in^3	5 ft on center	790
Coyote willow	*Salix exigua*	Shrub	Live cutting	10-12 ft, 2-3.5" diameter	Clusters of 4; 3 ft on center	3370
Booth willow	*Salix boothii*	Shrub	Tubeling	10 in^3	3 ft on center	840
Geyer willow	*Salix geyeriana*	Shrub	Tubeling	10 in^3	3 ft on center	840
Nootka rose	*Rosa nutkana*	Shrub	Tubeling	10 in^3	3 ft on center	840
Mock orange	*Philadelphus lewisii*	Shrub	Tubeling	10 in^3	3 ft on center	840

TRANSITIONAL PLANTING ZONES (37 ACRES)						
COMMON NAME	**SCIENTIFIC NAME**	**STOCK**	**TYPE**	**SIZE**	**DENSITY**	**QUANTITY (EA)**
Black cottonwood	*Populus trichocarpa*	Tree	Live cutting	10-12 ft, 2-3.5" diameter	Clusters of 4; 15 ft on center	12740
Pacific willow	*Salix lasiandra*	Tree	Live cutting	10-12 ft, 2-3.5" diameter	Clusters of 4; 15 ft on center	12740
Chokecherry	*Prunus virginiana*	Shrub	Tubeling	10 in^3	6 ft on center	6690
Nootka rose	*Rosa nutkana*	Shrub	Tubeling	10 in^3	6 ft on center	6690
Golden currant	*Ribes aureum*	Shrub	Tubeling	10 in^3	6 ft on center	6690
Skunkbush sumac	*Rhus trilobata*	Shrub	Tubeling	10 in^3	6 ft on center	6690
Mock orange	*Philadelphus lewisii*	Shrub	Tubeling	10 in^3	6 ft on center	6690

UPLAND PLANTING ZONES (92 ACRES)						
COMMON NAME	**SCIENTIFIC NAME**	**STOCK**	**TYPE**	**SIZE**	**DENSITY**	**QUANTITY (EA)**
Red elderberry	*Sambucus racemosa*	Shrub	Tubeling	10 in^3	15 ft on center	8920
Common snowberry	*Symphoricarpos albus*	Shrub	Tubeling	10 in^3	15 ft on center	8920
Basin wildrye	*Leymus cinereus*	Herbaceous	Tubeling	4 in^3	6 ft on center	46860
Blue wildrye	*Elymus glaucus*	Herbaceous	Tubeling	4 in^3	6 ft on center	46860

NOTE:

QUANTITIES SHOWN REPRESENT NUMBER OF PLANT NEEDED TO REVEGTATE THE ENTIRE PROJECT SITE. PHASING TO BE DETERMINED IN FINAL DESIGN PACKAGE.

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REVEGETATION DETAILS, SEED MIX & PLANTING TABLES

SHEET 21 OF 21